New Hampshire
Division of Welfare

Title XIX
Quality Control Project

THIRD YEAR REPORT

Project Sponsored By:

Office of Policy, Planning, and Research
Health Care Financing Administration
Department of Health, Education, and Welfare

State of New Hampshire
DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF WELFARE
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RICHARD G. LACOMBE
Director

February 7, 1979

Dr. Clifton R. Gaus
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Policy, Planning and Research
Health Care Financing Administration
Switzer Building - Room 5054
330 C Street, S. W.
Washington, D. C. 20201

Dear Dr. Gaus:

Please find attached our Third Year Final Report to the Health Care Financing Administration from the "Title XIX Quality Control Project." We have learned a great deal in the performance of this project and hope to capitalize fully on its' promise. Our independent evaluation contractor found that the Error Prone Profile System is cost effective and should be implemented in New Hampshire. Thus, we hope in this report to share with other States what we have learned and how the Error Prone Profile System can be most effectively used.

In this covering letter, I wish to thank the members of our research unit that made this project possible. Mr. Alan Friedberg deserves much credit for the success of the project. His ability and commitment to making the system work assured its success. Mr. Brian Cummings and Ms. Judy Cummings served extremely well as senior researchers and carried the project through the final months. MAXIMUS, our research contractor, was responsible for the research design during the three-year effort and is continuing its focus on the development of the Error Prone Profile System Software. Vance Industries provided valuable work on the cost benefit analysis included in this report.

With this Report, let me say that comments and questions are both welcome. We hope to continue to be able to make a contribution to the Nation's public assistance programs.

Yours truly,

Richard G. Lacombe
Director
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RGL/ba
Attachment

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I. INTRODUCTION AND SUMMARY

I. INTRODUCTION AND SUMMARY

In this third and final report of the Title XIX Demonstration Project, we summarize our accomplishments and present to other States what we have learned during the project. The Report is organized into five sections. In this Introduction and Summary section, we begin by providing an overview of the project, what it attempted to accomplish, and what actually happened. We describe how an Error Prone Profile System can be used in a positive and constructive manner to improve the management of the eligibility determination process.

In the second section, we define what profiles are, discuss the profile development process, describe how they are used, and explain the computer software available for generating profiles. In the third section, we provide a detailed discussion of the Intensive Sequential Review as a corrective action on error prone cases. Next, in the fourth section, we present the actual results achieved when demonstrating the system in four District Offices. This section is the complete report of the independent evaluation contractor. Finally, in the fifth section, we provide our recommendations on how other States can adopt and adapt our system to their use.

In a series of appendices, we also provide (1) a Listing of Computer Program for Honeywell 6600 used to generate the profiles, (2) a Users Manual for New Hampshire Honeywell 6600, (3) Questionnaires and Code Sheets used for Intensive Sequential Review (ISR),

(4) the Worksheets used by the reviewers for the ISR, and
(5) Additional Statistical Results on the ISR.

A. BACKGROUND

This project was initiated in October, 1975, with the purpose of testing the concept of using an Error Prone Profile System to improve the management of the eligibility determination process for the Medically Needy population. Over $900,000 of Federal funds were spent during the three years in developing and testing the system. The benefits already received by our State have probably nearly matched this figure, considering that over 600 cases were found to be in error. This measure of the potential savings was achieved despite the fact that the system was in the research phase for the First Year, and that the Second Year was devoted to a limited test of the System.

As will be shown later, the benefit-to-cost ratio achieved by the system in this test was estimated as being substantially greater than one, but less than seven to one. The improvements made during the Third Year, we believe, will increase the benefit-to-cost ratio by over 50 percent. Since the cost of the Medicaid Program in New Hampshire is different from other States, however, the benefit-to-cost ratio may differ elsewhere.

B. PURPOSE AND APPROACH OF PROJECT

The purpose of the project, then, was to reduce the cost of the State's Medicaid Program by scientifically selecting the cases most likely to be in error and then subjecting these cases to a more careful review for eligibility.

To do this, the First Year was devoted to developing the technique for selecting the error prone cases from the entire caseload.

All available statistical approaches for selecting error prone cases were reviewed for their applicability to New Hampshire. The approaches examined included, among others:

- linear discriminant analysis,
- regression analysis,
- automatic interaction detection (AID).

It was felt that each of these techniques had features which created troublesome problems. Therefore, a new approach was developed based on a stochastic (or probabilistic) search procedure (similar to those used in the computer programs that play chess) that did exactly what we wanted. The performance of the software program which carries out this approach is described in the second section of this report.

The Second Year was devoted to the demonstration of the system. Characteristic profiles were developed and matched to actual case records. Some 400 cases were intensively reviewed for eligibility; as predicted, over 200 <u>error</u> cases were found. The system proved that it could work. Refinements were needed, however, in the approach used to review the cases.

First, the basic concept of the Eligibility Verification Unit (EVU)*, a special team of well-trained staff designated to review the error prone cases, needed strengthening. Second, each

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* Initially called a Data Verification Unit (DVU).

EVU member had a caseload of only 6 to 8 cases per month; we believed that the same number of errors could have been found much faster if the reviews were performed more efficiently. And third, several new ideas for improving the statistical approach were conceived.

In the Final Year, a new type of review procedure called the Intensive Sequential Review was employed, which is described in detail in Section III. Also, the computer software was programmed to eliminate the requirement for human intervention in various stages of the profile generation process. It was felt that such a feature was essential if the system was to be used by non-technical persons in other States. Moreover, the cost-benefit evaluation of the Second Year demonstration was completed and this report was prepared.

C. ACCOMPLISHMENTS OF THE PROJECT

We believe the project has achieved a great deal. First, it contributed to the redesign of the Medicaid Eligibility Quality Control System. The sample design, using the eligibility file as a sample frame, originated in New Hampshire. The idea was to group claims by case in order to estimate the cost of the eligibility determination errors. The new Medicaid Quality Control System is based on this concept.

Second, we developed a software program specifically designed to generate error-prone profiles for the Medicaid Program. The program listing and instructions for its use are provided as an Appendix of this report. The profiles generated

are believed to be more efficient than those generated by other available software.

Third, this is the first Error Prone Profile System operating in a State to have been evaluated by an independent evaluation contractor. Systems such as those implemented in Texas, West Virginia, and South Carolina have not been formally evaluated. The New Hampshire experience shows conclusively that such systems can, in fact, be highly cost effective and capable of reducing a State's error rate.

Fourth, the Error Prone Profile System is being examined by the Corrective Action Project in the Health Care Financing Administration for dissemination to other interested States. A National Conference on Workload Planning Systems is featuring the New Hampshire system in a number of different workshops, and the Office of Child Support Enforcement is adopting its use for prioritizing cases in the Child Support Enforcement Program (CSEP).

In conclusion, in our opinion the system is a practical, cost-effective, worthwhile, and proven management tool that can be used, with minor modifications, by any State to improve its Medicaid Program. Moreover, the system can be used for identifying error prone cases in the AFDC and Food Stamp Programs as well. Our recommendations for implementing the system are contained in Chapter V.

II. THE PROFILE DEVELOPMENT PROCESS

II. THE PROFILE DEVELOPMENT PROCESS

In this part of the report we introduce some basic concepts about generating profiles and show how the software developed in this project can be used by other States. First, we present briefly the rationale behind the development of the particular statistical approach selected. Second, we present the two most important characteristics of any profile and show how administrators can construct profiles particularly suited to their own needs. Third, we "walk" the reader through a particular management problem and illustrate the results that are possible. Finally, we describe the computer software developed for constructing profiles, show how data are entered, and how the output can be interpreted.

A. APPROACH FOR COMPUTING PROFILES

Over the past three years the research staff has been developing a unique statistical approach in New Hampshire for generating profiles. In this section we explain why the new approach was sought and describe what it offers.

The selection of members of a defined population for a particular attribute (such as error-proneness), using only a set of specified characteristics, has long been an important problem in statistics. Credit scores used by banks, rejection criteria adopted by the Internal Revenue Service, and decision rules used by District Attorneys for prosecuting criminal cases, for example, are all determined using statistical techniques.

Thus, there are a number of software packages available which States can adopt to construct profiles of error prone cases. Except for the West Virginia software program which was developed specifically for identifying error prone AFDC cases, all other available software programs were developed for general purpose use.

The programs and approaches that we examined for generating profiles included:

- linear discriminant analysis;
- regression, logit, and probit analysis;
- conditional probability;
  - automatic interaction detection (AID)
  - X^2 significant variables (West Virginia)

Since the eligibility requirements for Medicaid recipients are as non-numerical (living arrangement, categorical relationship) as numerical (income, resources), we decided to focus our attention on those techniques that had the fewest numerical assumptions. This left the conditional probability approach as the primary candidate.

The AID technique was not selected because it classifies an entire population into several groups, rather than select a single group of predetermined size or error rate, which is what we were most interested in. The conditional probability approach developed by West Virginia was not used because it too classified the caseload into multiple groups with similar characteristics, rather than selecting a single group which is the most error prone. Moreover, both the AID and West Virginia programs used <u>sequential search</u> procedures, looking

for statistically significant characteristics one at a time. We do not believe this is as effective as a simultaneous search procedure, where the interaction of several variables is evaluated.

Finally, neither program provided the control that we required over the characteristics of the final profile obtained. For example, we wished to specify the fraction of the caseload that the profile would fit in order to control the workload of the EVU.

These and other aspects of the different approaches were studied. Exhibit II-1 on the following page summarizes some of the major features of the different techniques. The exhibit reflects our own beliefs about the techniques.

B. THE BASIC IDEAS BEHIND A PROFILE

The essence of a profile technique is to find particular combinations of case characteristics that can be used to select cases with the highest error rates. For example, consider Exhibit II-2 below.

Exhibit II-2

PERCENT OF MEDICALLY NEEDY CASES IN ERROR BY TWO CHARACTERISTICS: MARITAL STATUS AND INCOME STATUS

Characteristics		Income Status: Earned Income	Unearned Income	No Reported Income	Row Weighted Average
Marital Status	Married	78%	38%	18%	32%
	Unmarried	45%	25%	6%	17%
	Column Weighted Average	61%	30%	12%	21%

Exhibit II-1

COMPARISON OF PROFILE GENERATION TECHNIQUES USED IN PUBLIC ASSISTANCE PROGRAMS

CLASSIFICATION TECHNIQUE	TYPE OF VARIABLES DEPENDENT	INDEPENDENT	SCALES OF MEASUREMENT	PARAMETRIC ASSUMPTIONS	INTERACTION EFFECTS	OBJECTIVE FUNCTION	VARIABLE SELECTION	SEARCH PROCEDURE	CONTROL OVER PROFILE PARAMETERS
SSI (AID)	CONTINUOUS	DISCRETE	NOMINAL	NONE	NON-ADDITIVE	NOT PROVIDED FOR	VARIANCE REDUCTION	SEQUENTIAL	FAIR
SOUTH CAROLINA LINEAR DISCRIMINANT ANALYSIS	BINARY	CONTINUOUS	RATIO OR INTERVAL	MULTIVARIATE NORMAL	ADDITIVE LINEAR	RATIO OF PROBABILITIES OF MISCLASS-IFICATION	STATISTICAL SIGNIFICANCE	SIMULTANEOUS	EXCELLENT
TEXAS REGRESSION ANALYSIS	CONTINUOUS OR BINARY	CONTINUOUS OR DISCRETE	RATIO OR INTERVAL	NONE	ADDITIVE LINEAR	NOT PROVIDED FOR	STATISTICAL SIGNIFICANCE	SIMULTANEOUS	GOOD
TYMSHARE CONDITIONAL PROBABILITY	BINARY	DISCRETE	NOMINAL	NONE	NON-ADDITIVE	NOT PROVIDED FOR	x^2 TEST	MANUAL TRIAL AND ERROR	POOR
WEST VIRGINIA CONDITIONAL PROBABILITY	BINARY	DISCRETE	NOMINAL	NONE	NON-ADDITIVE	NOT PROVIDED FOR	x^2 TEST	SEQUENTIAL	FAIR
NEW HAMPSHIRE CONDITIONAL PROBABILITY	BINARY	DISCRETE	NOMINAL	NONE	NON-ADDITIVE	ANY NON-LINEAR FUNCTION	TEST OF PROPORTIONS	SIMULTANEOUS STOCHASTIC	EXCELLENT

The overall average error rate for the entire population is 21%, as shown in the lower right hand entry in the table. Note that the error rate is shown as 32% for married cases and 17% for unmarried cases. Also, 61% of all earned income cases were found to be in error, along with 30% of cases with unearned income, and 18% of cases with no income. The error rate for other combinations of the characteristics are shown at the intersection of the appropriate row and column.

The conditional probability approach is basically a reflection of the above exhibit. That is, the error rate for a particular profile can be expressed as the probability a case will be in error given (or <u>conditioned</u> on the fact) that it has a certain combination of characteristics. For example, every conditional probability technique we have encountered would generate a profile in the particular example shown above of "Married <u>and</u> Earned Income". The error rate for the combination, 78%, is the probability of error given the case is married <u>and</u> has earned income.

Most profile techniques would select the highest error rate subpopulation in the exhibit by combining two characteristics with an <u>and</u> logical connector. This approach relying on <u>and</u> logical connectors is used by all conditional probability techniques we have encountered.

We wished to have more flexibility in generating profiles by adding both <u>or</u> logical connectors and <u>not</u> logical connectors, so that we could develop a more refined profile. For example, we could specify a profile as:

- Earned Income <u>or</u> Unearned Income;
- Married <u>and</u> (Earned Income <u>or</u> Unearned Income);
- <u>Not</u> (Unmarried <u>and</u> No Reported Income).

The point is that by using <u>all</u> the logical connectors (called "Boolean" operators in mathematical terms), we can develop a very selective profile and have greater flexibility in our approach. Our method for including the <u>not</u> logical connector makes a significant contribution to the power of the technique.

Since putting these combinations together to form profiles is an endless process when the number of characteristics is large, we had to develop a computer program to do this for us. The program operates on a probabilistic (or stochastic) search procedure which is based on generating random numbers in a controlled and intelligent fashion, much the same way some computer programs are programmed to play chess. The number of possible moves in a chess game is seemingly infinite. Since we were dealing with some 150 variables or characteristics, each with three or four different values, we had to adopt the stochastic search procedure for our profiles, also. No other classification technique we know of uses this procedure.

In addition, no other conditional probability technique allowed us to control the form or nature of the profile that was going to be printed out by the computer. We desired to control the number of cases that fit our profile, so that the workload could be managed by the Eligibility Verification

Unit. In addition, we wanted to be able to control the minimum error rate that the profile cases would have. Thus, we had to develop our own computer programs. For the technical reader, the New Hampshire classification approach can be characterized as a conditional probability approach using Boolean logic and a stochastic search technique for meeting pre-specified profile parameters.

C. THE TWO PARAMETERS DESCRIBING ANY PROFILE

To specify the type of profile that is needed, it is important to understand the important parameters or descriptors of profiles in general. Basically, we describe profiles in New Hampshire along two dimensions:

> Fit - or the percentage of total cases that fit the profile, and
>
> Yield - or the percentage of profile cases that are in error.

The Fit of a profile (a parameter denoted by p in our previous reports) can be used to regulate the workload of the Eligibility Verification Unit designated to review the error prone cases. For example, assume that the EVU is staffed to review an average of one hundred cases per month, and the State usually processes one thousand cases per month (both applications and redeterminations). Then, a profile that fits 10% of the number of applications scheduled each month can be used to divert cases to the EVU for review. The profile will insure that the 10% diverted to the EVU has the highest probability of being in error.

The Yield (denoted mathematically as q in our previous reports) is a measure of the quality or efficiency of a profile. The higher the yield, the better the profile. The Yield can be measured either in terms of the percent of profile cases in error, or the percent of the total profile dollars that are in error. A focus on dollars appears to be the best way to proceed in the future. We were not able to do this in our project because . dollars paid out to the cases were not recorded in the research data base. Thus, suitably modified, the profiles can be expected to select the highest dollar error cases.

The fact is, however, that there is a trade-off between Fit and Yield. The higher the number of cases that have to fit the profile, the lower the potential yield of the profile. Conversely, the higher the probability of error desired, the lower the number of cases that can fit the profile. Thus, it is important to understand the trade-off in order to properly determine the best profile to generate and use.

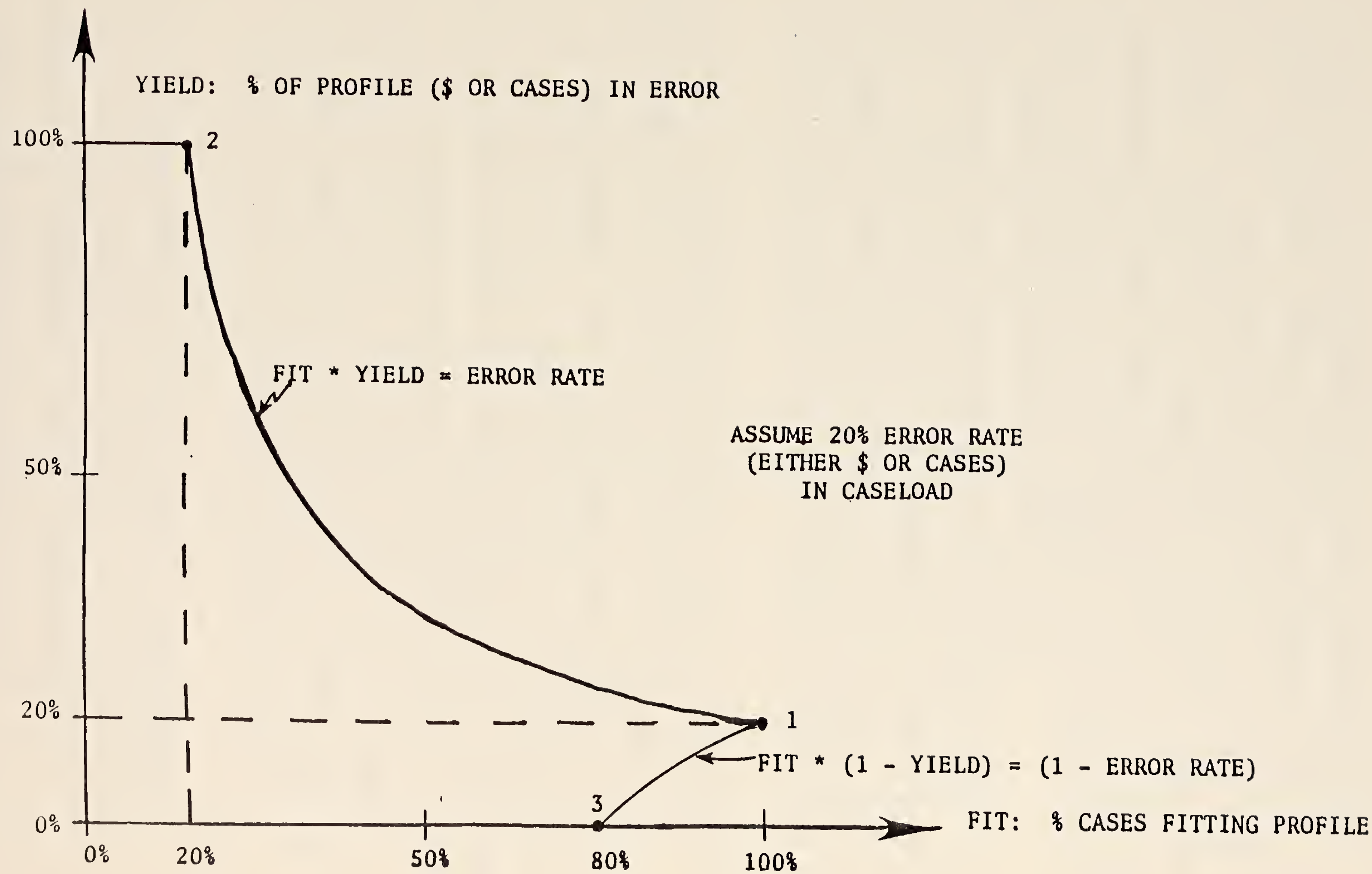
Exhibit II-3 on the next page describes the Fit/Yield trade-off mathematically for technical readers. The curve in the exhibit represents the boundary for the profiles. No profile can have a Fit/Yield combination outside this boundary.

D. EXAMPLE OF HOW TO SPECIFY THE PARAMETERS OF A PROFILE

Assume that a particular District Office has 30 case technicians processing approximately 2000 cases (applications and redeterminations) per month. The supervisor decides to select five senior technicians and form an Eligibility Verification Unit (EVU) in the District Office.

Exhibit II-3

YIELD VS. FIT CURVE



Given that the Intensive Sequential Review (described in detail in the next section) takes on the average about eight hours per case, a case technician can be expected to review about 20 cases per month. The EVU can, therefore, review 100 cases per month. (The remaining 25 case technicians in the District Office will be reviewing 1900 cases, but these cases will be less difficult and less time will be required to review them.)

The Fit that should be specified for this profile, then, is 100/2000 or 5%. The Yield that can be obtained for this Fit will depend on the power of the statistical approaches used and on the predictive ability of the characteristics collected in the data base.

Alternatively, the Director may specify that only cases with at least a 60% probability of being in error should be sent to the Eligibility Verification Unit. By keeping the error rate above 60% the cost of conducting the intensive review will be more than offset by the savings achieved by correcting the error. The higher the review cost, the greater the yield of the profile has to be to achieve a specified benefit-to-cost ratio. As a rule of thumb, in order to be cost effective, the yield must be greater than the cost of the review divided by the expected savings per error corrected.

In Exhibit II-4 we show the yields actually obtained for specified fits for three different categories of the medically-needy population in New Hampshire. These categories are:

- Adult-Independent Cases—those which are SSI-related and have independent living arrangements. They include some spend-down cases but are not related to the AFDC cases.

- Adult-Nursing Home Cases—SSI-related cases residing in public and private nursing homes. Again, the cases include some spend-down cases but none categorically related to the AFDC program.

- AFDC-Related Cases—these cases are not eligible for AFDC because of income or resources (or are eligible for AFDC but choose not to apply), but do apply for Medicaid benefits. Included also in this category are a small number of child welfare cases which show no parent or guardian.

The data base used to construct the profiles consisted of 758 cases randomly drawn from the State's caseload. Note that the best Yield which can be obtained with a Fit of 20% is lower than that which can be obtained for a Fit of 10%.

Exhibit II-4

YIELD (OR ERROR RATE) FOR CASES FITTING PROFILES

Profile Fit	Adult Independent	Adult Nursing Home	AFDC-Related
10% of Cases	76%	92%	77%
20% of Cases	61%	77%	58%
All Cases	17%	30%	27%

Note that the profiles fitting 10% of the cases for the different categories are 76%, 92%, and 77% accurate in selecting error cases. Thus, the profiles can be very effective in selecting error cases from different categories.

Profiles can also be developed for use at application or redetermination, or for agency vs. recipient error or, for that matter, for eligibility vs. payment error. In West Virginia, for example, agency error profiles trigger one type of selective case action and recipient error profiles trigger other types.

The error rates for cases not fitting the profiles and the percent of the total number of errors that the profiles will detect can also be computed, as can the expected dollar savings the profile system can achieve in a month, when the dollars in error are recorded in the data base. The methods for doing this has been described in earlier reports. These results for profiles with a Fit of 20% are shown in Exhibit II-5.

Exhibit II-5

ADDITIONAL STATISTICS OF PROFILES WITH 20% FIT

	Adult Independent	Adult Nursing Home	AFDC-Related
Error Rate in Non-Profile Cases	5%	18%	7%
% Total State Errors Captured by Profile Cases	72%	52%	68%

Thus, the profiles can reduce the State's error rates by 72%, 52%, and 68% in the different categories, representing significant dollar savings for the State.

E. SOFTWARE PROGRAM AVAILABLE IN THIS REPORT

In order that other States can make use of the software developed under this project, we have provided a copy of the program listing in Fortran IV as an appendix. The flowchart for the software is provided in Exhibit II-6. An explanation of each subroutine is beyond the scope of this report, but a description of the inputs and outputs is not. Therefore, we proceed with these descriptions.

1. <u>System Input</u>

In order to operate the computer terminal, the user need not have any prior knowledge of computers—the terminal is simply used as a typewriter. One of the key features of this software is that <u>no human intervention</u> is required in the profile generation process. The program is completely automatic.

The commands the computer gives are as follows:

(1) IF THIS IS A RESTART RUN, ENTER 1 AND HIT CARRIAGE RETURN; OTHERWISE JUST HIT CARRIAGE RETURN.

This information is needed to speed up the running time of the computer program. If a profile has just been developed, the program can be restarted in the middle of the coding to reduce the time needed to compute a second profile. If the program is being run for the first time in a session, hit the carriage return key.

(2) TO INCLUDE BOTH APPLICATION AND REDETERMINATION ERRORS, USE CARRIAGE RETURN; OTHERWISE, ENTER 1 FOR APPLICATION ERRORS ONLY. ENTER 2 FOR REDETERMINATION ERRORS ONLY.

This response is to generate profiles for application or redetermination errors only. It may be desirable, for example, to focus attention on the new applications to ensure no new errors are allowed to occur in the caseload.

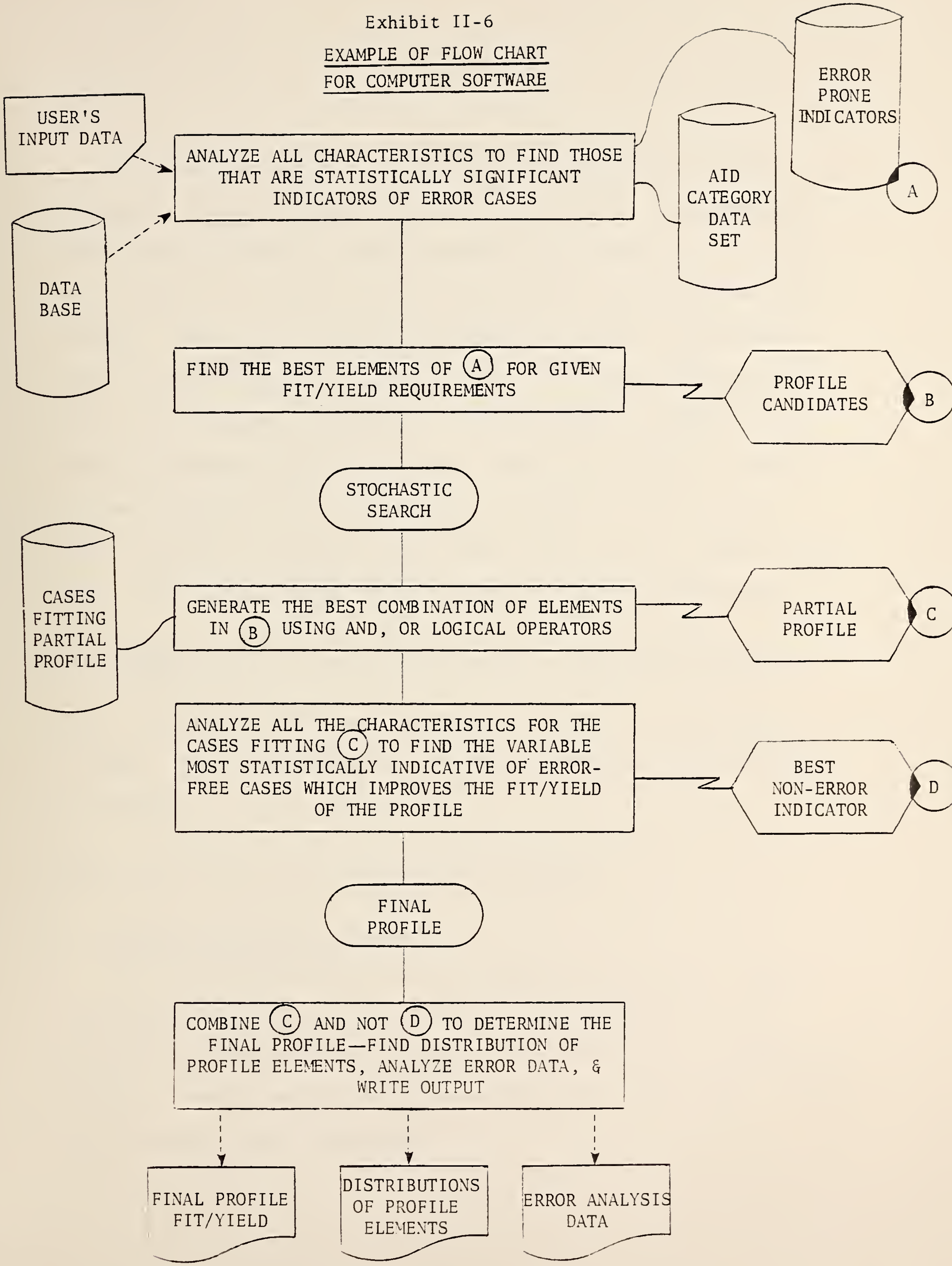
(3) ENTER 1 FOR ADULT INDEPENDENT PROFILE. ENTER 2 FOR NURSING HOME PROFILE. ENTER 3 FOR AFDC-RELATED PROFILE

This response simply tells the program for which category of cases a profile is desired.

(4) ENTER FORM OF PROFILE DESIRED. ENTER 1 FOR FIT (OR "P") PROFILE. ENTER 2 FOR YIELD (OR "Q") PROFILE.

Exhibit II-6

EXAMPLE OF FLOW CHART
FOR COMPUTER SOFTWARE



As described earlier, the value of specifying a Fit Profile is that the workload of the EVU can be managed more effectively. That is, the proportion of cases that the EVU can process is diverted to them from the caseload processing stream. The value of the Yield Profile is that the administrator is guaranteed a minimum error rate among the profile cases. The computer finds the largest number of cases that have the minimum yield specified. This is useful if a minimum cost benefit ratio is desired. That is, if it is only cost effective to review cases that have, say, at least a 75% error rate; these cases can be picked out by the computer.

(5) ENTER FIT OR YIELD VALUE DESIRED. BEGIN WITH DECIMAL POINT.

Thus, if a Fit of 10% were desired, the entry ".10" should be made. If a minimum yield of 75% is desired, ".75" should be entered.

This is all the input required of the user.

2. Output Provided by System

The potential output of the system is enormous, since statistics are computed on virtually every aspect of the eligibility determination process. For purposes of simplicity, however, we have constrained the output to a few items. Others can be added later as desired.

The following four exhibits show the outputs for the Adult Independent profile with a yield of at least 85%. The first gives a description of the profile generated.

Exhibit II-7

PRINTOUT OF COMPUTER PROFILE

MINIMUM YIELD	=	.8500
PROFILE YIELD	=	.8846
PROFILE FIT	=	.0675
AVG. ERROR VALUE $	=	$?????
% TOTAL ERRORS	=	.3480
ERROR RATE RATIO	=	7.384

Note that the software generated a yield that was slightly high. The tolerance built into the system is to achieve a profile yield (or fit) within 5% of the target yield (or fit). The profile fit is .0675; or, 6.75% of all cases will fit the profile. The next item, AVERAGE ERROR VALUE, shows question marks. As of the preparation of this report, we had not included the dollars each case was in error in the data base; therefore, the ???'s.

The fourth item, % TOTAL ERRORS, shows the percent of the total errors in the caseload that are captured in the profile cases. Thus, the figure .3480 shows that 34.8% of all errors

in the State will be eliminated if all the cases fitting the profile are intensively reviewed. Considering only 6.75% of all the cases will be reviewed, this reduction is highly significant. This figure is important in assessing the overall impact of the Error Prone Profile System.

The final figure, ERROR RATE RATIO, shows how much faster error cases can be found among the profile cases than among the nonprofile cases. To compute the ratio, the error rate for profile cases is divided by the error rate for nonprofile cases. The ratio, therefore, shows that the EVU is seven times more likely to find an error in the profile cases as in the nonprofile cases.

Exhibit II-8 on the following page shows the case characteristics which the computer selected as the best profile meeting the input specifications. The heading VAR # refers to the variable number of the data collection form, and the VALUE refers to the value of that variable. We did not have the time to store the meaning of each value of each variable in the computer, so that the meaning could be printed instead of the numbers. Perhaps a later version of the software will have this capability.

Exhibit II-8

MEANING OF PROFILE CHARACTERIZATIONS

CHARACTERISTIC	VAR #	VALUE	MEANING
1	19	2	NO SSI BENEFITS RECEIVED
2	4	15	IN/OUT STATUS
3	13	1	FULL-TIME EMPLOYMENT DURING REVIEW PERIOD
4	74	4	SPOUSE'S INCOME NOT CONSIDERED INITIALLY OR FOR REDETERMINATION
5	134	0	NOT A NEW APPLICATION CASE

Exhibit II-9 shows how the characteristics are logically linked. The statement, "RECIPIENT MUST HAVE AT LEAST ONE OF THE FOLLOWING," means that the presence of just one of the listed characteristics is sufficient to constitute a match. But, the case must have at least one of the characteristics each time the phrase is repeated.

The other phrase, "RECIPIENT MUST NOT HAVE," will sometimes be present in the profile and sometimes not present. When it is, it simply means that the case must not have the characteristic indicated by the VAR # and VALUE.

In summary, for the Adult Independent profile we have been using for discussion purposes, the profile shown in Exhibit II-9 can be described as:

1 and (2 or 3 or 4) not 5

using the characteristic numbers given in Exhibit II-8

In order to translate the profile to a format that the caseworker can use, it is only necessary to substitute the variable meaning for the variable number in the table.

Exhibit II-10 provides some details on the cases which fit the profile. These data can be used for corrective action planning. Based on the cause of errors, we see that some 52% of the errors have been attributed to the recipient and some 48% to the agency. Of the recipient-caused errors, some 28% were due to the recipient not reporting a change of circumstance, and 30% were due to incomplete information. A full 42% of all recipient errors were caused by recipients supplying incorrect information. As for the types of agency errors found in the profile cases, the most

Exhibit II-9

CHARACTERISTIC PROFILE

RECIPIENT MUST HAVE AT LEAST ONE OF THE FOLLOWING:		RECIPIENT MUST HAVE AT LEAST ONE OF THE FOLLOWING:		RECIPIENT MUST NOT HAVE:	
VAR #	VALUE	VAR #	VALUE	VAR #	VALUE
19	2	4	15	134	0
		13	1		
		74	4		

Exhibit II-10

CAUSE OF ERRORS

	CAUSE OF ERROR		PERCENTAGE
	RECIPIENT ERRORS ONLY	0.5217 PERCENT OF TOTAL ERROR	
1	CHANGE IN CIRCUMSTANCES NOT REPORTED		0.2817
2	INFORMATION IS INCORRECT		0.4167
3	INFORMATION IS INCOMPLETE		0.3016
			1.0000
	AGENCY ERRORS ONLY	0.4783 PERCENT OF TOTAL ERROR	
4	CORRECT POLICY-WRONG APPLICATION		0.0500
5	WRONG POLICY APPLIED		0.2500
6	REPORTED INFORMATION NOT APPLICABLE/IGNORED		0.3500
7	FAILURE TO FOLLOW UP ON IMPENDING CHANGES		0.0500
8	DID NOT FOLLOW UP ON INCONSISTANT/INCOMPLETE INFORMATION		0.0500
9	DID NOT VERIFY WHERE REQUIRED BY AGENCY POLICY		0.0500
10	ARITHMETIC COMPUTATION		0.1000
11	INFO. FROM SSA IS INACCURATE		0.0500
12	INFO. FROM SSA IS MISUSED BY STATE AGENCY		0.0500
			1.0000

prominent were "Wrong Policy Applied" and "Reported Information Not Applied or Ignored."

This information is useful because it tells the administrator that the recipient is failing to report complete and accurate information and the caseworkers are ignoring the information that is provided. To reduce errors, then, it is clear that the interview and verification process should be strengthened and that selective supervisory or peer re-reviews may be required.

Exhibit II-11 presents even more detail on the profile error cases. Here, the forty-five nature codes used in the Medicaid Quality Control System are displayed. In the exhibit, we have indexed the fourteen types of errors printed out for this Adult-Independent Profile for discussion. The major types of error are numbers 2, 3, 5, and 7 which account for 70% of all the errors. Most of the errors are related to bank account and other resources in excess of allowed limits, unearned income understated, and total income in excess of the limit.

Finally, Exhibit II-12 presents a very important output product of the system. This distribution of profile characteristics (or Profile Control Sheet) provides a check on the types of cases being matched to ensure that they are representative of the data base used to generate the profiles. For example, the exhibit shows that 100% of all profile cases have a value of 2 for variable 19. If in matching casefolders we find

Exhibit II-11

DISTRIBUTION OF TYPES OF ERRORS COMMITTED

INDEX	TYPE OF ERROR	PERCENTAGE
1	NOT A NH RESIDENT—REVIEW PERIOD	0.0435
2	BANK ACCOUNTS IN EXCESS/LIMIT	0.1739
3	TOTAL RESOURCES EXCESS/LIMIT	0.1304
4	EARNED INCOME EXCESSIVE	0.0217
5	UNEARNED INCOME EXCESSIVE	0.2391
6	UNEARNED INCOME OVERSTATED	0.0217
7	TOTAL INCOME IN EXCESS/LIMIT	0.1522
8	GROSS INCOME OVER COUNTED	0.0217
9	GROSS INCOME UNDER COUNTED	0.0652
10	RECIPIENT LIABILITY UNDERSTATED	0.0435
11	RECIPIENT LIABILITY OVERSTATED	0.0435
12	SPEND-DOWN COMPUTATION INCORRECT	0.0217
13	GRANDFATHER CLAUSE APPL/INCORRECT	0.0217
14	3RD PARTY LIABILITY APPL/INCORRECT	0.0217

Exhibit II-12

DISTRIBUTION OF PROFILE CHARACTERISTICS FOR PROFILE POPULATION

CHARACTERISTIC VAR #	VALUE	PERCENTAGE OF ALL PROFILE CASES CASES HAVING CHARACTERISTIC	PERCENTAGE OF PROFILE CASES IN ERROR HAVING CHARACTERISTIC
19	2	1.0000	0.8519
4	15	0.1481	1.0000
13	1	0.1852	1.0000
74	4	0.5185	0.7857

that, say, only 60% of the matches have this characteristic, then something may be wrong. Similarly, if we begin to observe a percentage of cases much greater than 14.81% having variable 4 equal to 15, then the population being matched is not representative of the sample population used to provide the profile data.

This mismatching could mean one of two things: 1) the profiles have to be updated, as they are no longer applicable or, 2) an unseen intervening characteristic, which is highly explanatory, is dominating the results. In both cases, it is wise to update the profile, using the cases just reviewed.

This, then, is the output available from the software program. Undoubtedly as the system matures, it will produce more meaningful information for corrective action. The listing for the Honeywell 6600 we use in New Hampshire is presented in Appendix A. We caution States, however, that some modifications may be required if they choose to adapt the software to their own computer hardware or data bases.

III. THE INTENSIVE SEQUENTIAL REVIEW (ISR)

III. THE INTENSIVE SEQUENTIAL REVIEW (ISR)

In this section, we discuss the Intensive Sequential Review, which comprises the procedures used to review the error prone cases. First, we describe the component parts of the ISR. Second, we present a comparison of cost effectiveness of the four sequential levels of review that are possible. Finally, we present the specific procedures employed in conducting the Intensive Sequential Review.

A. COMPONENTS OF THE INTENSIVE SEQUENTIAL REVIEW

The key to a successful Error Prone Profile System is to have well-designed procedures to follow when an error prone case is encountered. A number of different States have developed different review procedures to initiate when an error prone case has been identified. Since space does not permit discussing all these procedures here, we focus only on the procedure we used. Before an error-prone case can be reviewed, however, it must first be identified. Since our automated Eligibility Management System (EMS) in New Hampshire was not operational during the demonstration phase of the project, our matching process was performed manually.

Basically, profile sheets were developed which listed the characteristics of the error prone cases. Then, case folders in the different District Offices were pulled and checked to determine if the case had the prescribed set of characteristics. If it did, the case was forwarded to the EVU for intensive review. This profile matching process was

found to be inexact at times. Sometimes the case folder would contain incorrect information and cause us to believe that the case was error prone when in fact it was not. The EVU would subsequently find in the intensive review that the information in the case folder was incorrect. On the other hand, we did not attempt to determine the number of error prone cases that the matching process failed to detect because of incorrect case folder information. The matching process, nonetheless, was believed to be at least 90% accurate.

Once a case is matched, some action must be taken to determine whether the case is, indeed, in error. In the first year of the project we developed the Intensive Review, which subjected every case to a comprehensive review, taking some 24 person hours. This is contrasted with a normal State review taking two to four person hours. The Intensive Review was even more intensive than a quality control-type review. For example, at the same time our project was reporting a 23% error rate for the State, the MEQC Unit was reporting 16%. Since our research staff was able to spend more time looking for errors, we found more.

During the demonstration phase of the Second Year, we recognized that the Intensive Reviews could be conducted more efficiently. It was decided to consider the sequence of the review effort, since the record review was very inexpensive and caught about half the errors committed. The investigative portion of the review, on the other hand, was the most expensive to conduct. We therefore began the development of the Intensive Sequential Reviews (ISR) with three basic principles in mind:

- The highest level of the ISR should be an intensive quality control-type investigation such as that conducted during the Second Year demonstration phase.

- Each successive lower level of review should consist of different types of review actions.

- Each level of review should follow logically and build upon the information collected in previous reviews.

Since the intent of the ISR was to develop review procedures that were error-type specific, we undertook an analysis of the types of errors possible. The basic dichotomy of errors is agency error and recipient error, as indicated in the following list of error types recognized by the MQC system.

Exhibit III-1

TYPES OF ERRORS RECOGNIZED BY MQC

AGENCY ERRORS

1. Correct policy but incorrectly applied.
2. Wrong policy applied.
3. Reported information disregarded or not applied.
4. Reported information inaccurate.
5. Failure to follow up on impending changes.
6. Failure to follow up on inconsistent or incomplete information.
7. Failure to verify where required by agency policy.
8. Arithmetic computation.

RECIPIENT ERRORS

1. Changes in circumstances not reported.
2. Information provided is incorrect.
3. Information provided is incomplete.

By construction, an agency error is an error that can be attributed solely to the agency. An agency error occurs when a recipient provides complete and accurate information, but the agency either misuses or disregards the information in the determination of eligibility. It is clear, therefore, that a review of the information in the case record and the manner in which it was treated by the eligibility worker would detect agency errors. Thus, our primary level of review became a record review.

Few recipient errors, however, can be discovered during a record review because the recipient has furnished the agency with incomplete or incorrect information, or has failed to report a change in circumstances. Moreover, recipient errors can be either inadvertent or deliberate with intent to defeat the eligibility determination process. For ease of explanation, we discuss each type of recipient error individually.

Recipient errors of the type where reported information is incorrect occur when a recipient provides the agency with complete but inaccurate information about his/her own circumstances. For example, a recipient reports that his only resource is a savings account in the Concord Savings Bank with a balance of $500. A subsequent Quality Control Investigation reveals that, indeed, the savings account is the recipient's only asset, but that the balance is $3,500. This type of error, regardless of whether it is deliberate or inadvertent, is detected by verifying the information supplied by the recipient and recorded in the case record. Thus, the second

level of review was the verification review. When we say second level of review, we mean that both the record review and the verification reviews are conducted.

Recipient errors which involve the reporting of incomplete information can again be either intentional or inadvertent, and the intensity of review required to detect the error may vary accordingly. If the recipient reported incomplete information inadvertently, not realizing what was required, or perhaps just due to oversight, then an additional, more extensive eligibility interview in the recipient's own home could possibly result in more complete information. Assuming that additional information is obtained during the home interview, the possibility exists that it too is incorrect and therefore must be verified. Thus, our third level of review includes a home interview with the recipient and a subsequent verification of any additional information obtained during the interview.

Most errors involving the deliberate reporting of incorrect or incomplete information can be detected only through an investigative effort. Such an investigation would also detect those errors involving the inadvertent reporting of incomplete information which was not discovered earlier. Thus, our fourth level of review was the intensive quality control-type investigation which, as already mentioned, is the uppermost end point of the ISR and which should, theoretically, detect all errors not previously detected at lower levels. Again, by the fourth level, we mean that all previous levels are also conducted.

In summary, the Intensive Sequential Review consists of four different levels conducted in order.

- Level 1 Review: Record Review
- Level 2 Review: Level 1 Review plus a verification of information recorded in the case record.
- Level 3 Review: Level 2 Review plus a home interview and verification of additional information obtained in the interview.
- Level 4 Review: Level 3 Review plus an intensive quality control-type of investigation.

A final type of error not yet discussed is "change in circumstances not reported," which, like other recipient errors, can either be deliberate or inadvertent. Additionally, this type of error differs from "reported information is incorrect" and "reported information is incomplete" errors only in a temporal sense. This type of error can typically be detected at any review level other than the first.

In addition to the different types of reviews for the four ISR levels, there also exist quantitative differences in terms of review scope. Since the Level 1 Review involved a review of only that information reported in the case record, it was performed entirely within the office, and was accomplished rather quickly and inexpensively. We therefore specified that a Level 1 Record Review should encompass all elements of eligibility.

ISR Level 2 Reviews and Level 3 Reviews involved verification of reported information which necessitated contacting agencies, firms, and individuals outside the office. Since these reviews were somewhat more expensive, we decided

to limit the scope of the Level 2 Reviews and Level 3 Reviews to only income and resource related elements of eligibility, which historically have accounted for about 93% of all errors detected. Since Level 4 Review theoretically detects all errors not previously detected in lower levels, it was necessary that it encompass all elements of eligibility.

In summary, Level 1 Review is a record review of all elements of eligibility; Level 2 Review includes a verification of information reported in the case record and pertaining to income and resources; Level 3 Review includes a home interview with the recipient and a subsequent verification of any income- or resources-related information that has not been either reported at a Level 1 Review or verified at a Level 2 Review. The Level 4 Review includes a quality control-type investigation encompassing all elements of eligibility.

B. RESULTS OF 235 INTENSIVE REVIEWS CONDUCTED IN THE THIRD YEAR

In the Third Year, we collected a number of statistics on the Intensive Sequential Review. The purposes were to answer the following questions:

- What does it cost to conduct the first, second, third, and fourth level reviews?
- What percent of the initial errors in a case are found at each level?
- What is the dollar value of the error found at each level?
- What is the relative cost effectiveness of the different levels of review?

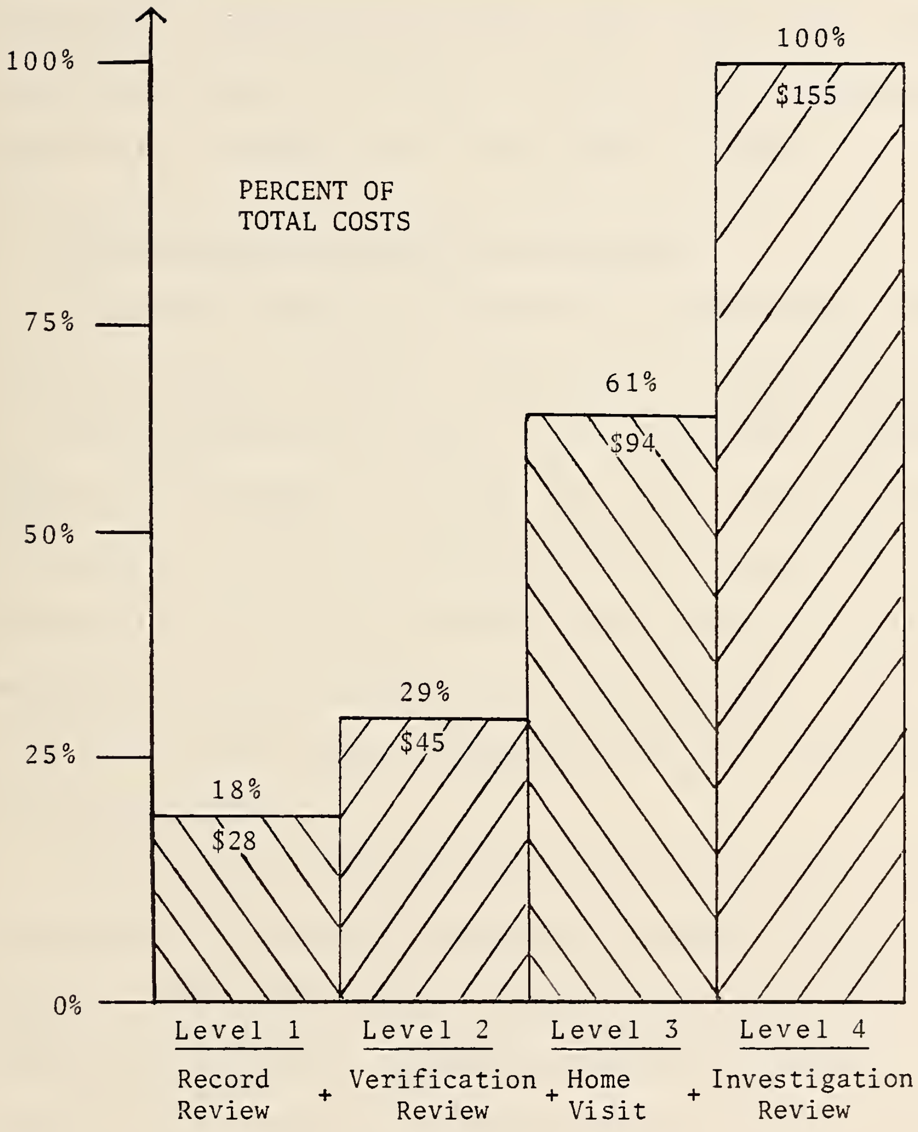
1. Cost of the Different Levels of Review

In order to identify the most cost effective review level to be used by the Eligibility Verification Unit, it is necessary to know how much each level of review costs to conduct. Thus, the project staff kept an accurate record of their actual productive time on a particular case. For each level of review, the staff reviewer recorded the hours spent on the review and his or her travel expenses. Overhead costs were also estimated to arrive at a total cost for each level of review. In effect, all levels of review were conducted for each case; the results, however, were recorded as each level was completed.

Using our best assessment, we believe that $155 is the cost of a Level 4 Review. Recall that a Level 4 Review includes all previous levels. The cost of $155 for the Level 4 Review has been confirmed by both our research contractor and our evaluation contractor. Given this figure is correct, we "adjusted" the total costs indicated in all the staff members review sheets up to $155 in order to account for the costs of nonproductive time in the total cost of the review. With this adjustment, then, Exhibit III-2 shows the costs of the reviews combined for Adult-Independent, Nursing Home, and AFDC-related cases. No significant differences were noted for the costs of review for the different categories of the Medically Needy/Non-Money Payment Population.

Exhibit III-2

COST AS A PERCENT OF LEVEL 4 REVIEW



It can be seen in the exhibit that a record review costs approximately $28; the verification review costs another $17, raising the total cumulative cost to $45. The home visit and subsequent verification review costs about $49, bringing the cumulative total to $94 and, finally, the investigative review costs $61, bringing the final total to $155.

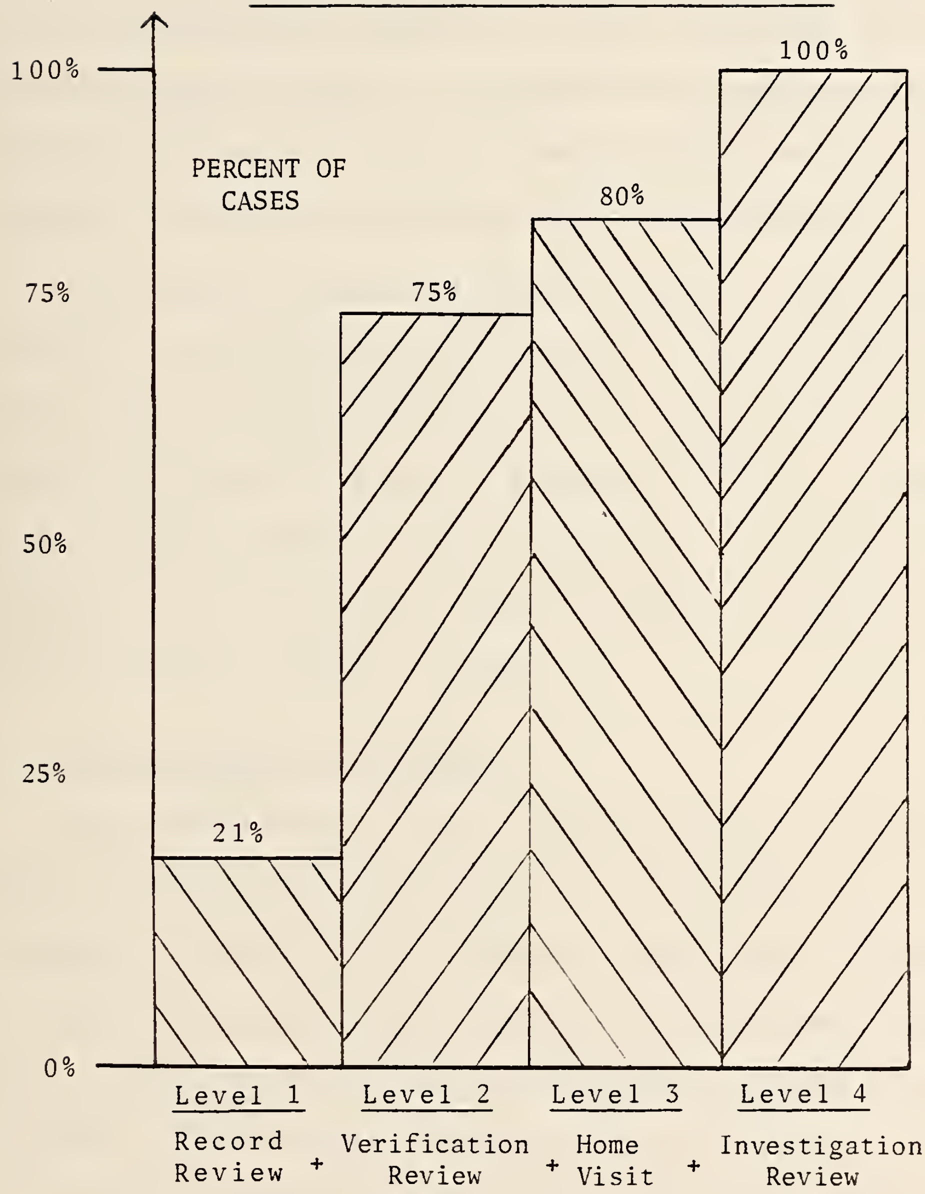
2. Effectiveness of Each Review Level

The next question we wanted to answer was: How many errors did each level of review detect, and were they found in the investigative review or in the record review? The answer is important, since we can tell what the return is, in errors, for each different level of expenditure in costs. Exhibit III-3 on the following page provides the answers aggregated over all eligibility categories. The variation in effectiveness among categories was not significant given the sample sizes.

Note that the Record Review uncovered only 21% of all the cases ultimately found to be in error in the Level 4 Review. These 21% were, however, all agency errors. The Verification Review, following the Record Review, picked up 75% of all the cases ultimately found to be in error. These errors were predominently (over 80%) recipient caused errors, though there were a few agency errors for failure to apply correct policy. Level 3 Review errors were also more than

Exhibit III-3

PERCENT OF CASES FOUND IN ERROR



80% recipient errors. Level 4 Review errors were almost equally split between agency and recipient. Recipient errors were predominantly failure to report complete information, although some changes in circumstances were not reported. Seventy-five percent of the agency errors were attributed to reported information disregarded or not applied.*

Knowing the number of errors found at each level of review may not be sufficient, though, if the dollar value of the error found varies significantly for each level of review. Some have argued that the big dollar errors are found quickly in the record review stage. Others have proposed that the hardest errors to find—at least recipient caused errors—may be the largest in dollar terms.

3. Dollar Value of the Error

The dollar value of the errors found at each level of review, then, is another important indication of the effectiveness of each level of review. The dollar values completed for this report are based on the total erroneous payments made to recipients during the six-month eligibility period reviewed. This figure, though easy to collect, is not necessarily a good proxy for the dollars that could have been saved if the error had not been committed.

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*Most of the Level 4 agency errors were third-party liability errors and claims processing errors. As a ground rule for the ISR, we decided to count these errors as Level 4 errors.

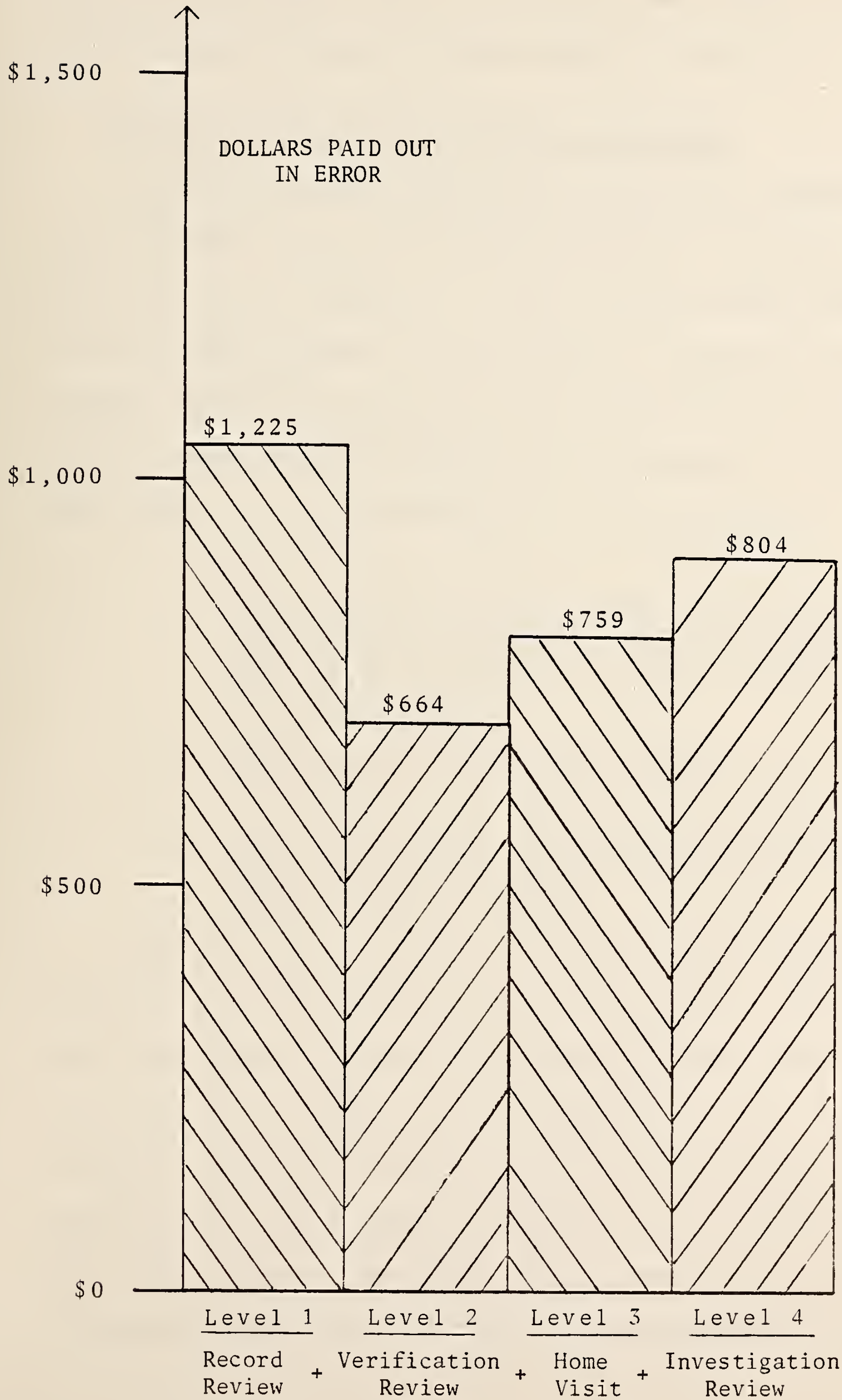
First, as explained in detail in our Second Year Report, the recipient can sometimes take action to restore eligibility once it is denied. In the cases reviewed in 1975 and 1976, it was estimated that only 41% of the dollars spent in error could actually have been saved during the six-month period in question. Thus, the measure overestimates the dollars that can be saved.

On the other hand, we know that new application cases stay on the rolls some 27 months, on the average, after being accepted as eligible. If errors are caught at application, the dollar savings may be applicable to the entire 27-month period, not just the six-month period covered by the estimates shown here. Similarly, cases reviewed at redetermination stay on the rolls some 18 months after being reviewed. (Some cases never reach the first redetermination point, thus lowering the average time new application cases stay on the rolls.) Hence, the dollars paid out in error in a six-month period definitely underestimate the dollars in error paid out over 18 months and 27 months. Whether the dollars paid out in error in six months are less than the dollars that can be saved in 18 months and 27 months respectively is not known.

Notice that, in fact, the largest dollar errors are found in the Level 1 Review. Level 2 Review drops the cumulative average considerably to only $664. Level 3 Review and Level 4 Review's each bring up the average to $804. We should also point out that nursing home errors account for the majority of

Exhibit III-4

DOLLARS PAID OUT IN ERROR FOR EACH CASE FOUND IN ERROR DURING A SIX-MONTH REVIEW PERIOD



the dollars in error. A scientifically targeted review effort, then, would focus first on nursing home errors, and more specifically on nursing home payment errors.

4. Relative Cost-Effectiveness of Reviews

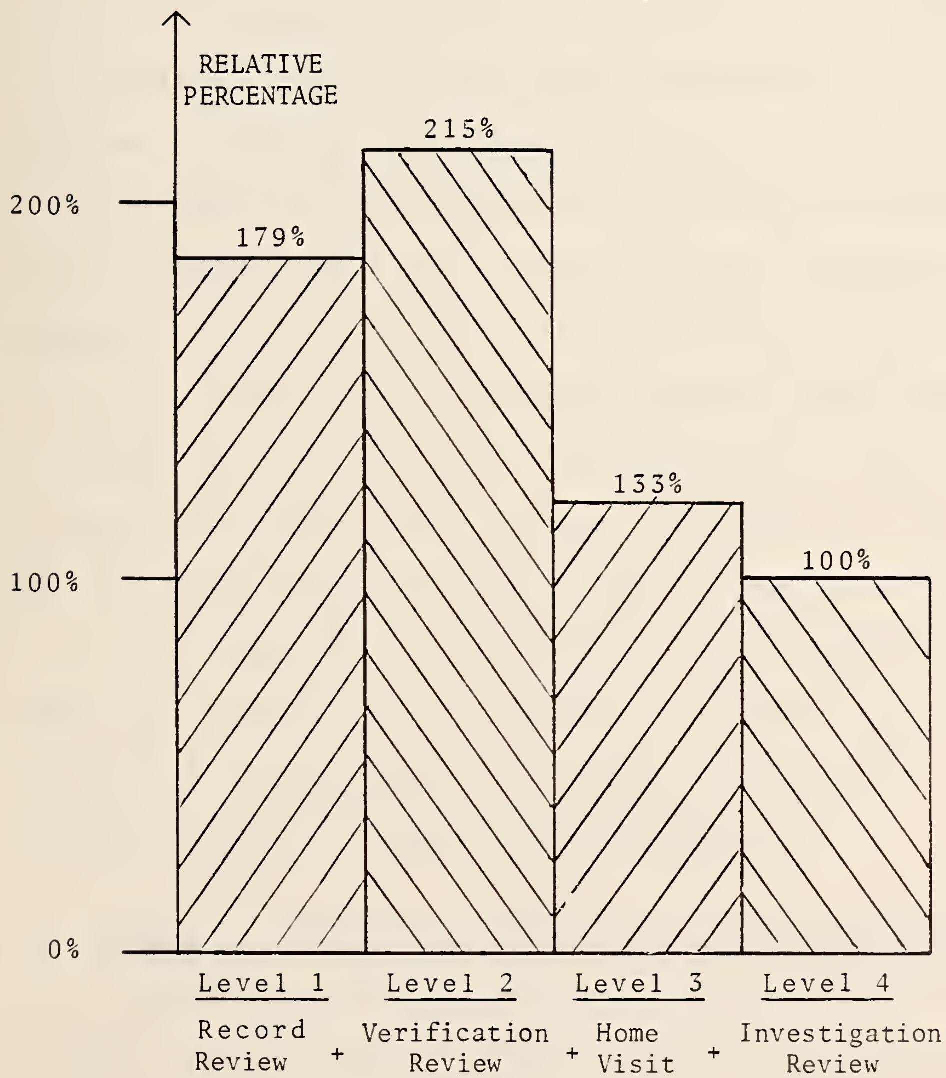
In order to determine the relative cost effectiveness of the different levels of review, we had to combine the results of the previous exhibits. (The problem remains that the effectiveness figures we are using are measuring only the dollars paid out in error during a six-month period, not the dollars that can be saved in 18 or 27 months.) The figures in the exhibits were obtained in the following way:

- The percent of cases found in error at each level given in Exhibit III-2 was multiplied by the six-month dollar errors in Exhibit III-3. This gave an expected dollars in error for each level of review.
- These figures were then divided by the costs of each level of review given in Exhibit III-1.
- The result was then adjusted to show the Level 4 Review as 100% effectiveness of the other levels of review.

Exhibit III-5, on the following page, then shows the relative cost effectiveness of the different Levels of Review. Note that Level 2 Review is inherently over twice as cost-effective as the full-scale intensive review. Even Level 1 Reviews and Level 3 Reviews are relatively more cost-effective. These results confirmed our suspicions in the Second Year: that the Intensive Review could be refined by conducting it in a sequential manner. In fact, we have seemed to show that a

Exhibit III-5

RELATIVE COST EFFECTIVENESS OF REVIEW LEVELS



Level 2 Review is more than adequate as a corrective action and the full Intensive Review is not needed in New Hampshire. Thus, the EVU should be structured to conduct Record Reviews and selective Verifications rather than home visits and full field investigation reviews.

5. <u>Absolute Cost Effectiveness of Reviews</u>

To compute the aboslute cost effectiveness or benefit-to-cost ratio of each review level would require that we know the yield of each profile (the proportion of cases reviewed that will be found in error when subjected to a Level 4 Review.) Although, we can estimate the latter figure to be around 75% or higher, depending on the <u>fit</u> of the profile (the proportion of the total caseload fitting the profile), we cannot estimate the former figure with any confidence of accuracy. We do know, however, that the benefit-to-cost ratio is greater than two to one, since our most conservative assumptions return this figure. To obtain an exact figure we would have to follow recipients for at least three years.

For a more detailed treatment of the problem of estimating absolute benefits of the system, the reader may refer to the report of the independent evaluation contractor, Vance Industries, Inc., presented in Chapter IV.

C. <u>SPECIFIC INTENSIVE SEQUENTIAL REVIEW PROCEDURES EMPLOYED</u>

The project staff performed Intensive Sequential Reviews on 235 error-prone New Hampshire Medicaid cases between May and September 1978. This was accomplished by an average of ten reviewers each handling 6-8 cases per month under the

guidance of two supervisors. This demonstration, covering the review period September 1977-February 1978, was conducted in four District Offices. The two rural offices were Lanconia and Claremont and the urban offices were Concord and Manchester. The selection of these offices was somewhat a result of the geographic distribution of the Title XIX project staff.

Each reviewer received his monthly caseload by the first of each month, to be completed by the last working day of that month. To assist in organizing the reviewer's time and effort in the reviews, a calendar was distributed each month breaking the review procedure down into its component parts. Thus, the reviewer knew how many days to allot to each phase of the review, enabling timely completion of the caseload. This schedule also assisted the supervisors in management of the data collection effort.

The Intensive Sequential Review (ISR) commences at a Level 1 Review with a thorough review of the District Office case record. The most recent case action, either new application or redetermination, is examined in detail. The information contained in this case action is entered onto the worksheet at the Level 1 Review location (Case Record Analysis). Simultaneous with this entry, through the use of carbon paper, a Level 1 Review Control Sheet is also filled out and turned in to the supervisor.

The elements of eligibility at all four levels are broken down into three groups: Income, Resources, and Categorical and Other. Elements pertaining to each of these groups are as follows:

INCOME	• Earned Income • Unemployment Compensation • SSA • SSI • Veterans Benefits • Support Payments • Other Income • Grandfather Coverage Provisions • Income Computations
RESOURCES	• Bank Accounts • Nursing Home Account • Prepaid Burial Arrangement • Life Insurance • Medical Insurance • Other • Resource Computations

CATEGORICAL AND OTHER	• Age • Citizenship/Legal Alien • Residency • Living Arrangement • Blindness/Disability • Marital Status • AFDC Deprivation Factor • Real Property • Disposal of Property

Once all the Level 1 Review items are recorded, the reviewer computes the financial eligibility for the recipient using the figures reported to the District Office. On both the Income and Resource pages there is a particular location for these computations. The resulting status is then noted on the Face Sheet of the Worksheet under Review Findings. The number of errors, dollar value, and the element and nature designation are all recorded here. The cost of the review is also entered here with the Level 1 Review cost being simply the amount of time it took to review the District Office record, fill out the Level 1 Review column on the worksheet, and compute eligibility multiplied by the Overhead Rate of $8.00 per hour.

Level 2 Review of the ISR approach builds upon a Level 1 Review. All income and resources reported at a Level 1 Review are verified at a Level 2 Review. This verification is obtained through the mail from various sources. The documented information

is then recorded at a Level 2 Review (Verified Information) on the worksheet and eligibility recomputed based on these verified amounts. Results are then recorded under Level 2 Review findings and the Cost of Review is computed. The Level 2 Review cost is the time it took to send out and record income and resource information from the various sources and the time for the actual computations of eligibility.

Fieldwork begins at a Level 3 Review with a thorough interview held at the recipient's residence. Using effective, nonthreatening interviewing techniques, the reviewer and recipient discuss topics ranging from place of birth through work history to burial arrangements. All of the resulting information is recorded in the first column under Level 3 Review (Information Reported During Interview.) After the interview and before the reviewer begins to verify income and resources, a Level 3 Review Control Sheet (identical to its Level 1 Review counterpart) is filled out and turned into the supervisor.

Not all of the information obtained at a Level 3 Review is immediately used but rather provides a basis for the intensive investigation to follow at a Level 4 Review. Only income and resources which were reported to the reviewer at the interview are now verified by mail and/or in person. Any item reported and verified at a previous level is simply carried over to the current level rather than reverified. As at previous levels, once the documentation is obtained, eligibility is computed and the status of the case is recorded

on the facesheet. The Cost of Review has an additional component of travel at a Level 3 Review.

A Level 4 Review is the indepth investigation of all eligibility related elements. The reviewer, based on information obtained to this point in the review, systematically proceeds to document each and every element of eligibility, following up on all leads to uncover any source of error. The list below provides the reader with a representative sample of the type of contacts made during the course of this level of review:

- Office of Vital Records
- Superior Court Records
- Registry of Deeds
- Registry of Probate
- Municipal Housing Authority
- Town City Clerks
- Banks
- Credit Unions
- Insurance Companies
- Stock Brokers
- Attorneys
- Schools
- Landlords
- Nursing Homes
- Funeral Homes
- Tax Collectors
- Social Security Administration
- Veteran's Administration
- Civil Service Administration

- Employers - past and present
- Numerous others as case circumstances warrant.

In addition to the above sources, contact with a recipient's relative or friend is often required to corroborate or supplement information obtained during the interview with the recipient. Claims histories are obtained from the data processing unit for each recipient and these are scrutinized for irregularities and/or payment errors. This Level 4 Review is analogous to the intensive review performed by this project during the development and demonstration of the Error Prone Profile System.

As each element is satisfactorily reviewed and documented, the results are noted on the worksheet (Findings of Field Investigation) and eligibility is computed. Resulting status of the case is then noted on the facesheet and the cost of the Level 4 Review computed. To assist the reviewer in computation of costs associated with each of the four levels, a series of time sheets were developed for each of the levels with the exception of a Level 1 Review. These time sheets were necessary because in actual operation a reviewer might work on all eight cases during the course of a day depending on mail and telephone calls received, necessitating extensive record keeping. These sheets enabled a more precise cost computation under these circumstances. As the reader will notice, although the cost of each level is computed separately, the cumulative cost of the review to a particular level is most important. The separate level costs provide a relative indicator of the component costs of an intensive review. However, since

the effect of the sequential reviews is cumulative, i.e.., a Level 2 Review actually requires Level 1 Review procedures plus Level 2 Review procedures, so the actual cost becomes a summation of One plus Two. Likewise, the Level 4 Review is actually made up of all four distinct sets of procedures or levels.

The final step in the Intensive Sequential Review is the completion of the questionnaire and the transfer of the coded answers to an answer sheet ready for keypunching and computer analysis. The Control Sheets completed at Level 1 Reviews and Level 3 Reviews are a tool which enables the supervisor to determine, at the final review, that each error is attributed to the appropriate level, thus preventing contamination of a given level by those above it.

IV. IMPACT AND COST BENEFIT ANALYSIS

IV. IMPACT AND COST BENEFIT ANALYSIS

During the course of the project, there were two evaluations conducted by our independent evaluation contractor. Both involved assessing the performance of the Error-Prone Profile System during the six-month pilot demonstration in 1977. The first, the Impact Analysis, focused on evaluating the impact of the System on the New Hampshire error rates. A summary of this evaluation is presented in Section A. The second, the Cost Benefit Analysis, focused on assessing the dollars saved by the System and the costs of achieving those savings. This analysis is presented in its entirety in Section B.

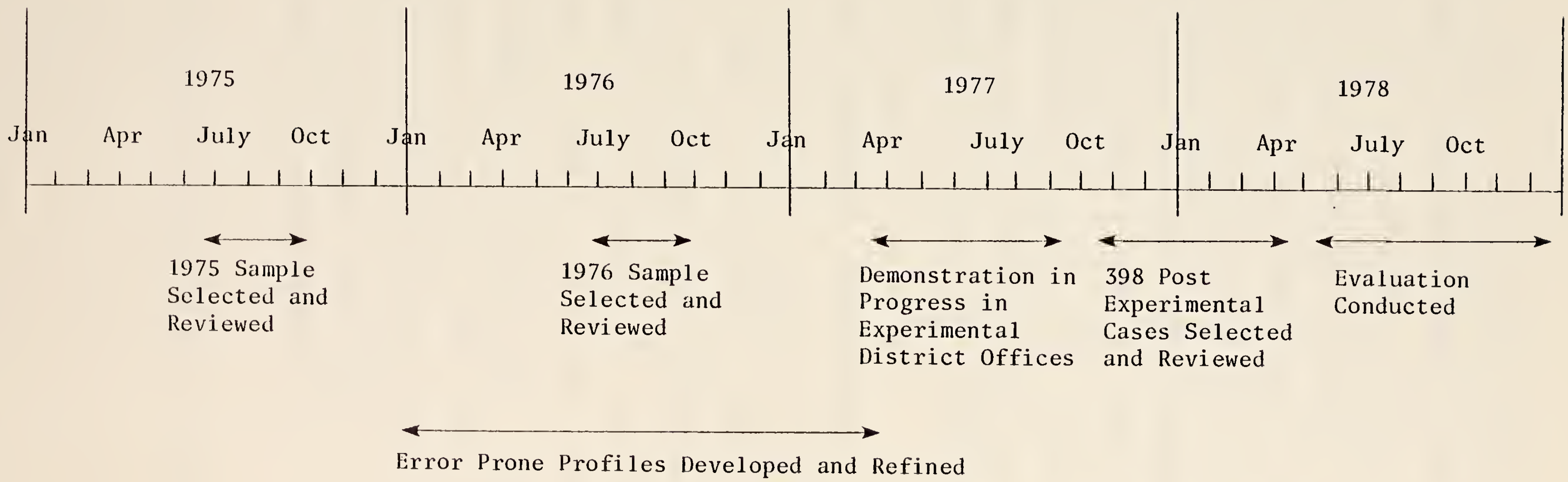
A. IMPACT ANALYSIS

The methodology employed in the impact analysis consisted of a "comparison of improvements" approach in which comparisons of the error rates were made before and after the implementation of the Error Prone Profile System in the experimental District Offices. Statistical procedures were employed to determine whether or not the differences in improvements between the experimental and control offices were statistically significant. The impact evaluation has been based upon the results of reviewing 728 pre-demonstration cases and 398 post-demonstration cases. As is shown in Exhibit IV-1 on the following page, the pre-demonstration cases were selected from the January-June reporting period lists for 1975 and 1976. Of the total of 758 cases reviewed, 30 were child welfare cases and were excluded from further analyses

Exhibit IV-1

CHRONOLOGY OF THE NEW HAMPSHIRE TITLE XIX QUALITY CONTROL PROJECT

(August 1978)



because of their small number. The remaining 728 cases were used <u>both</u> as the data base for the development of the error prone profiles and as a base for computing pre-demonstration error rates. Early in 1977 the decision was made to perform a six-month demonstration of the Error Prone Profile System in the Manchester, Concord/Franklin, Berlin and Conway District Offices. All other District Offices in the State were considered control offices. The demonstration lasted from March, 1977 through August, 1977. During this period error prone profiles for Adult Independent, Nursing Home and AFDC-related cases were implemented in these experiemntal District Offices, and reviews were undertaken for all cases that matched the profiles.

Between October, 1977 and March, 1978 a sample of almost 400 cases was selected from the Medicaid caseload as of August, 1977, in part to be used as a basis for updating the profiles but also to be used as the basis for computing post-demonstration error rates for Medicaid eligibility decisions. In this sample unlike the earlier samples taken in 1975 and 1976, cases were not selected in proportion to their number in the population. Rather, certain types of cases which would be likely to occur only infrequently in a proportionate sample of only 400—such as AFDC cases and cases which had been reviewed during the demonstration—were oversampled so that certain minimum numbers of them would appear in the sample.

The study findings of the evaluation can be summarized as follows:

- The Statewide error rate as measured by the project staff rose by 9% over the duration of the demonstration, from 23% to 32%.

- The increase in the experimental offices was only 3%, less than one-quarter of the 13% increase experienced to the control offices. This difference in improvements is highly statistically significant.

- This same pattern persists when attention is shifted to sub-groups of cases, i.e., it holds for AFDC related cases, for Adult cases in Nursing Homes, Adult cases in Independent Living Arrangements; it holds among all new application cases, and among all redetermination cases.

- The Error Prone Profile System detected errors in 86% of the cases later determined to be in error in the experimental District Offices.

The conclusion to be drawn from these data is unambiguous: the results of the evaluation strongly suggest that the Error Prone Profile System has had a positive impact upon the Medicaid error rate in the State of New Hampshire. In the next section the actual savings achieved are assessed.

B. COST BENEFIT ANALYSIS

The recently completed Cost Benefit Analysis conducted by Vance Industries is presented in total in this chapter. We believe the report fairly communicates what is known about the performance of the system as it was operating in the Second Year of the project in 1977.

The following should be kept in mind when reading the report, however.

- The term DVU stands for Data Verification Unit and is used instead of Eligibility Verification Unit (EVU) in this report. The name of the unit was changed in the Third Year to reflect the broader functions that the unit performs.

- The costs of the system that are complete assume, in effect, that a Level 4 review would be conducted on each case. In fact, with the ISR the Level 2 Review is more cost-effective, as shown in Chapter III.

- The number of error cases that were assumed to be eliminated was based on the profiles generated by the computer software program used in 1977. The current computer program generates profiles with yields about 25% higher than the old program and would therefore detect more errors.

- The benefits computed do not consider the workload reduction on the State's part realized because the EVU absorbed part of the workload.

Therefore, the analysis is believed to be conservative with respect to what can be achieved with the system.

ASSESSMENT OF BENEFITS AND COSTS OF THE NEW HAMPSHIRE TITLE XIX QUALITY CONTROL PROJECT

December 20, 1978

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Chapter 1

SUMMARY ANALYSIS OF BENEFITS AND COSTS OF THE ERROR PRONE PROFILE/DATA VERIFICATION UNIT SYSTEM

1.1 Introduction and Overview

The impact analysis of the Error Prone Profile/Data Verification Unit (EPP/DVU) system that was conducted by Vance Industries concluded that "this system has had a positive impact on the Medicaid error rate in the State." Using a comparison of improvements approach, the analysis concluded that the Medicaid error rate in the Test Offices was more than nine percent lower than it would have been had the EPP/DVU system not been implemented.

However, this information is not sufficient in and of itself to justify statewide implementation in New Hampshire, or transfer of the system to other States. As a first approximation, the EPP/DVU system should be considered worthy of statewide implementation and/or transfer to other States only if the incremental costs of implementing the system are outweighed by the increased savings that could reasonably be expected to accrue from the system.

This report has therefore been prepared to present the best available evidence concerning the issue of the relative benefits and costs of the EPP/DVU system that was developed and implemented as part of the New Hampshire Title XIX Quality Control Project.

Although it was not possible to conduct a definitive cost benefit analysis within the time and resource constraints of this study, Vance Industries has concluded that the dollar savings that would result from implementing the EPP/DVU system statewide in New Hampshire are, in all likelihood, substantially greater than the additional dollar costs associated with implementing the system. In short, the concept of an EPP/DVU system has been justified on cost-benefit terms.

This does not mean that the system as implemented in New Hampshire in the past should be replicated in all States without any further analysis or refinement. In the first place, as discussed below, there are important methodological issues pertaining to the calculation of benefits that could not be resolved in the course of this study. We have not, for example, been able to determine the frequency with which cases removed from the welfare rolls due to Medicaid Quality Control are likely to reappear on the rolls in the future due to changed circumstances (e.g., disposing of excess resources). We have not, in addition, been able to distinguish between the benefits resulting from discoveries of over- and underpayments (e.g., in spend-down cases) and those resulting from cases that are discovered to be wholly ineligible by the EPP/DVU system.

Secondly, there are many conceivable refinements to the EPP/DVU system that was implemented in New Hampshire (and that we have evaluated) that could bring about improvements in the ratio of benefits gained to incremental costs incurred. New Hampshire itself has developed several such refinements during the last year of the Title XIX project. Other States considering adoption of an EPP/DVU system can learn not only from the original EPP/DVU system that was implemented in New Hampshire, but also from the processes whereby New Hampshire has been proceeding to increase the efficiency of the profiles.

Finally, the analyses presented in this report are based upon the effectiveness of a specific EPP/DVU system as it operated

on that portion of the New Hampshire Medicaid caseload that was <u>not</u> automatically eligible for Medicaid by virtue of receipt of AFDC, i.e., those eligible for AFDC but not receiving it, the medically needy, and "spend-down" cases. It is by no means obvious that similar benefits would accrue to application of an EPP/DVU system to the entire New Hampshire Medicaid caseload, or to the Medicaid caseloads of other States. The caseloads in other States can be expected to vary in terms of proportions in each of the categories (AFDC-related, aged, blind, and disabled), in proportion institutionalized, in utilization of medical facilities, and so forth. Moreover, the levels of benefits paid to Medicaid recipients varies in other States. The administrative costs of public assistance programs also vary from State to State, adding yet another uncertainty to the efforts to extrapolate New Hampshire's expenses to other jurisdictions. <u>In short, we have concluded that the New Hampshire experience justifies active consideration of systems similar to the EPP/DVU system in other States. It does not guarantee that implementing the exact system utilized by New Hampshire in the past will always result in substantial overall savings.</u>

1.2 Summary of Tangible Project Benefits.

In order to develop an estimate of the benefits that would accrue to implementation of an EPP/DVU system, it is necessary to first estimate the impact of the system in lowering error rates, and then to estimate the dollar savings associated with the reduced proportion of ineligibles and payment error cases that remain on the rolls month after month. Impact data on the EPP/DVU system are available only for the New Hampshire caseload. Therefore we have had no choice but to conduct the estimation of benefits on the basis of implementing the system statewide in New Hampshire.

Moreover, in order to present a fair comparison of costs and benefits it is necessary that they both cover the same period of time. As is discussed in our analysis of project costs, we have assumed a four month start-up period for the full implementa-

tion of an EPP/DVU system. Therefore, during the first year of implementation, it is appropriate to assume that benefits would be accrued in only eight of the twelve months. As is illustrated in Exhibit 1-1 at the end of this chapter, the estimated present value of benefits of a full year of operation of the EPP/DVU system in New Hampshire are $2,026,967. Thus we would expect benefits of only about $1,351,311 resulting from the first year of operation. Assuming that health care costs increased by at least 12% by the second year of operation, and that the Medicaid claims increased proportionately, this would yield an estimated benefit of $2,270,203 in Year 2.*

The tangible benefits of the EPP/DVU system are discussed in greater detail in Chapter 2 below.

1.3 Summary of Tangible Project Costs

As was the case with benefits, the cost of implementing an EPP/DVU system would vary considerably from State to State. Therefore, for ease of calculation, and to promote comparibility among benefits and costs, we have estimated the costs of implementing the EPP/DVU system in New Hampshire if such a system had been developed elsewhere, i.e. without any initial "research and development" costs.

Given the New Hampshire Medicaid caseload, a set of profiles that delineated approximately 19% of the cases as error prone, and the current salary and cost structure of the New Hampshire Division of Welfare, it has been estimated that the costs of the first year of operation of an EPP/DVU system in the State would be $223,534.

Four of the first twelve months of operation of the system would be concerned solely with "start-up," adapting the profiles to New Hampshire, hiring staff, and so forth. Thus, the DVU would be fully staffed for only eight months. Since the DVU would be fully staffed for the entire second year of project operations, the total costs would rise (in constant dollars) to $280,212. Assuming a 7% inflation rate, these Year 2 costs would further rise to $299,827.**

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*The latest available data show that the medical care components of the cost of living index have been rising at just over 1% per month.

**The latest estimate of inflation for the coming year, given the voluntary wage-price guidelines, is approximately 7%.

The tangible project costs on the EPP/DVU system are discussed in greater detail in Chapter 3 below.

1.4 Impact of Intangible Costs and Benefits

The figures cited above describe dollar costs and benefits that can be clearly associated with the implementation of an EPP/DVU system. Excluded are a range of costs and benefits that cannot be readily measured.

Costs of activities that take place but are not billed to the EPP/DVU project represent a major cost category that cannot be readily estimated. A number of agencies outside of the New Hampshire Division of Welfare cooperated with DVU staff in a significant but undeterminable degree. For example, we do not know how much time banks devote to checking their records concerning potential bank accounts of Medicaid recipients. While such costs are in theory obtainable, the time and resource constraints upon this project did not allow for such analysis.

A second intangible cost is the opportunity cost of using resources to implement the EPP/DVU system, instead of applying them to some other activity. Regardless of the apparently great benefits of the EPP/DVU, there is no simple way to realize whether benefits might result from incurring different costs for different (or the same) purposes, because the available resources have already been allocated to the EPP/DVU.

Unmeasured (and unmeasurable) benefits include greater efficiency in District Office operations, and the benefits that would result from transfer of the system from the Medicaid program to other New Hampshire Welfare Division programs, and from transfer to other States.

If one assumes that organizations will begin to bill a Welfare Department for services once the cost of these services rises above some minimal level, it is reasonable to believe that the unmeasured costs are relatively low. Thus, it seems likely that, if anything, <u>the addition of intangible costs and benefits into an overall assessment of the EPP/DVU system would only increase the degree to which benefits exceed costs.</u>

1.5 Impact of Uncertainties on Estimates

As is described in detail in Chapters 2 and 3, the derivation of estimated benefits and costs has involved a large number of uncertainties. Wherever uncertainties arose, we have attempted to describe the relevant issues, the assumptions that we have made in resolving uncertainties, and the effect that different assumptions would have on the overall estimated costs and benefits.

As a general rule, we have attempted to be conservative in our analysis of costs. That is to say, where doubt about costs has arisen, we have adopted the higher estimates of costs. Thus, it is likely that the actual costs of implementing an EPP/DVU system are somewhat lower than the cost estimates we have presented.

Unfortunately, as already alluded to, our overall estimate of benefits is also probably higher than the actual benefits that would accrue to a State similar to New Hampshire that implemented this system. The reason for this is that all benefit calculations have, of necessity, been made on the (unrealistic) assumption that all cases that are kept off the rolls due to corrective action activities and/or are removed from the rolls for this reason will remain off the rolls forever. In other words, we are assuming that once a case has been determined to be ineligible, it will always remain ineligible and not re-apply.

In contrast to the above assumption, it is reasonable to believe that in some instances, members of such cases will either "spend-down" their assets--or less likely, reduce their income--to become eligible. Since it has not been possible (within the dollar and time constraints of this project) to calculate how often these changes in circumstances occur, we have excluded any consideration of them from our calculations. It should be noted, however, that since the estimated maximum benefits outweigh the estimated costs by a factor of more than seven to one, even if the estimated benefits have been exaggerated three-fold, they would still substantially outweigh estimated costs. The relationship between estimated costs and benefits is illustrated in Exhibit 1-2 at the end of this chapter.

Moreover, as is discussed in this report, the costs of the EPP/DVU system can be expected to be relatively level (in constant dollars) over time, and would rise primarily in response to inflation and rises in Medicaid caseloads.

It is by no means as obvious that the benefits of the system would remain relatively constant. It seems reasonable to believe that the impact of the system might decline over time as more and more error cases were removed from the system so that, assuming a constant caseload size for review, the number of error cases available to be identified would decrease. In short, it cannot be guaranteed that the benefit stream would continue unabated for five to ten years. Therefore, it is important that States carefully monitor costs and benefits of the system over time so that changes will be instituted as they become appropriate.

Even assuming a decrease in annual benefits over time, however, it seems evident that a huge decrease would have to occur before estimated costs outweighed benefits. For example, if it is conservatively assumed that all benefits in future years result from preventing ineligible new applications from entering the rolls, the present value of benefits (using current data) would be $1,080,088 (see Exhibit 2-1 on page 16), resulting from preventing 407 cases from entering the rolls. Uninflated costs for a full year of operation, however, total only $280,212. Not until the number of new applications cases caught fell to 105 would costs exceed benefits.

Thus, in this example, the efficiency of the DVU at catching ineligible redetermination cases could fall to zero, and efficiency at catching ineligible new applications would have to fall to 26 percent of current efficiency, all with no changes in costs, before the DVU system would begin to cost more than it saved in dollars alone.

1.6 Recommendations for the Future

During the past year, the New Hampshire Title XIX Quality Control Project staff have been experimenting with variations in the corrective action technique which would be less costly than

the Data Verification Unit. Further development and testing of these variations should be continued since they promise to further increase the extent to which benefits outweigh costs.

Regardless of these future efforts, however, the available data concerning benefits and costs of the EPP/DVU system in New Hampshire strongly suggest that both HEW and other State officials should study the system carefully and take steps to foster its implementation in other settings.

In addition to this, further research should be undertaken to (a) eliminate methodological uncertainties in the overall estimation of costs and benefits (especially the uncertainties involving the extent to which individuals and families removed from the rolls through Medicaid Quality Control change their circumstances and reapply); (b) derive more precise estimates of the relative costs and benefits of an EPP/DVU system on specific kinds of cases, e.g., AFDC-related, institutionalized, or spend-down; and (c) estimate the impact of an EPP/DVU (or similar) system upon States with differing caseload characteristics, different patterns of utilization of medical facilities, and so forth.

EXHIBIT 1-1

SUMMARY OF ESTIMATED COSTS AND MAXIMUM BENEFITS

	Year 1[1]	Year 2	Year 2[2] (inflated by 5.5%)
Costs	$ 233,534[3]	$ 280,212	$ 299,827
Benefits	$1,351,311[4]	$2,026,967	2,270,203

[1] Assumes start-up in Calendar 1978

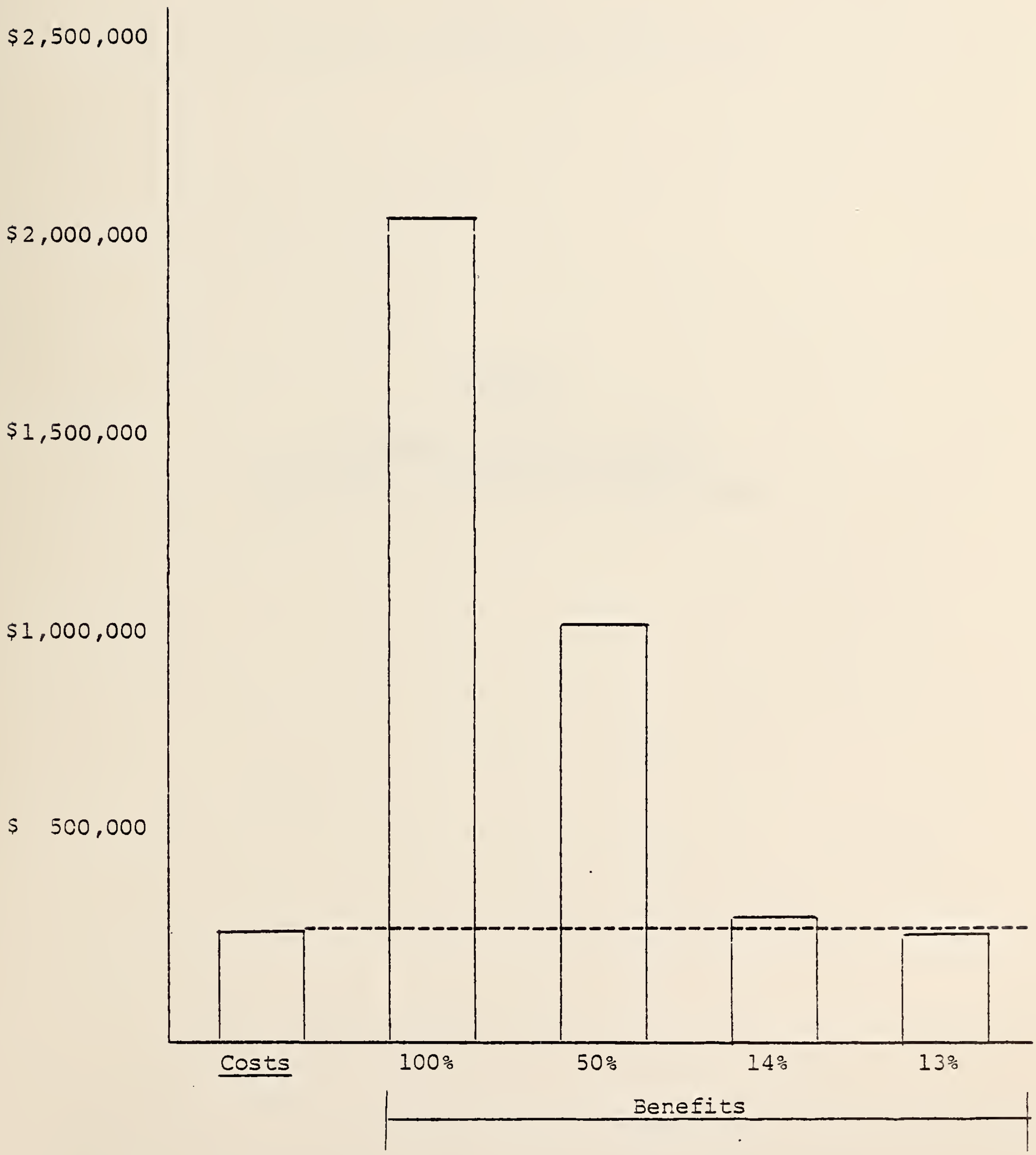
[2] Estimated inflation factor applied to Year 2 data are: costs to rise by 7%, benefits to rise by 12%. These statistics are justified in the text of this chapter.

[3] Year 1 variable costs are reduced by one-third from uninflated Year 2 costs. See Exhibit 3-1 for details.

[4] Year 1 benefits are estimated at 2/3 the uninflated Year 2 benefits, assuming 8 months of DVU operation in Year 1.

EXHIBIT 1-2

RELATIVE SCALE OF COSTS AND BENEFITS
(Using Data from Year 2 of Exhibit 1-1)



CHAPTER 2

BENEFITS OF THE ERROR PRONE PROFILE/DATA VERIFICATION UNIT SYSTEM

Chapter 2

BENEFITS OF THE ERROR PRONE PROFILE/DATA VERIFICATION UNIT SYSTEM

2.1 Introduction and Overview

2.1.1 Introduction

This section presents an analysis of the dollar benefits that could be expected to accrue to the State of New Hampshire if an EPP/DVU system were implemented statewide in 1978, and a detailed description of the methodology employed to compute these dollar benefits. Much of the data upon which our estimates have been made comes from years prior to 1978, but in order to make the benefit calculations comparable to the calculations of the estimated costs of implementing the EPP/DVU, we have attempted to estimate both as if they occurred in 1978. (An example of using data from different time periods as if they came from the same period may be found on page 17, step # 4.)

2.1.2 Approach

The direct benefits of the EPP/DVU system can be thought of as the sum of benefits associated with the operation of the system on new applications cases plus benefits associated with redeterminations.

New Application Cases

The successful operation of the EPP/DVU system on new applications will save money by preventing inappropriate cases from getting onto the rolls and/or by resulting in correct,

lower payments to cases correctly determined eligible but presently incorrectly granted excessive benefits. In other words, the system will reduce the proportion of ineligible cases that get onto the rolls and the proportion of payment errors. Therefore, to estimate the dollar benefits associated with this aspect of the EPP/DVU system, one must estimate the number of cases kept off the rolls or having payment levels corrected, and multiply this number by the average dollars saved per case. The average dollars saved per case can, in turn, be estimated by estimating how long the error would persist and multiplying this amount of time by the average monthly payment per (error) case.

Redetermination Cases

All Medicaid cases that are already on the rolls are (scheduled to be) redetermined at least once a year. A successful EPP/DVU system would catch a larger number of inappropriate cases on the rolls and a larger number of payment error cases than would normal redetermination procedures. Thus, in order to estimate the dollar benefits associated with the redetermination aspect of the EPP/DVU system one must estimate the extent to which the system lowered the incidence of ineligible cases and overpayments on the rolls, and multiply the number of cases eliminated or corrected by the system by the average dollars saved per case. As in the case of new applications, the dollars saved can be estimated by estimating the amount of time that the errors would have persisted without the EPP/DVU and multiplying this amount of time by the average monthly payment per (error) case.

When errors are discovered in redetermination cases, Welfare Division staff become aware of payments inappropriately disbursed in the past. But since efforts are rarely made to recoup such inappropriate past disbursements, we have not considered past recouped payments as benefits of the application of the EPP/DVU system to redetermination cases.

Treatment of Uncertainties

There is no infallible method of estimating any of the above referenced statistics in order to estimate the total benefits of the EPP/DVU system or any other corrective action plan. Given these uncertainties, we have chosen to provide 1) our single best estimate of the benefits that would accrue in 1978 from applying the EPP/DVU system in New Hampshire in this year, 2) our rationale for deriving this estimate of benefits, and 3) a discussion of various modifications in our approach that would affect the final estimated benefits. We do not address the issues of benefits in future years, but as discussed in Chapter 1, assume that the efficiency of the system will decline over time as more and more error cases are detected and eliminated from the system.

2.1.3 Estimated Benefits

It is our best judgment that the maximum savings associated with implementation of the EPP/DVU system in New Hampshire is $2,026,967 per year. As is shown in Exhibit 2-2 at the close of this discussion, this figure consists of a maximum of savings of $1,080,088 from errors detected in new applications cases and $946,879 from redetermination cases.

We use the term "maximum savings" because these estimates (and all estimates presented in this analysis) are based upon an assumption that once a case is detected to be in error, the applicant/recipient never chooses to change his or her circumstances to eliminate the factor causing ineligibility and then re-apply. In other words, the estimates in this analysis make no provision for cases in which an individual would "spend-down" assets, or even reduce his or her income, in order to meet eligibility standards. Nor do they account for those error cases that may become non-error cases over time because of random changes of circumstances (e.g., decrease of income). We feel confident that such changes in circumstances must take place in some proportion of cases judged to be ineligible. But since we do not have the resources to conduct a special study

on these subjects, we do not know how often such changes take place, and how soon such cases again appear correctly on the rolls.[1]

Clearly, the potential benefits derived from catching ineligible cases and removing them from the rolls are decreased to the extent that members of the case change circumstances and become eligible again. But since we cannot estimate how often this occurs, we can merely state that <u>all</u> benefit estimates presented here are high, and need to be reduced by some undetermined amount. It should be noted, however, that our benefit estimate is more than seven times greater than the projected costs of employing the DVU, and therefore, it would take a more than sevenfold reduction of benefits before the cost actually outweighed the benefits of employing the EPP/DVU system.

The remainder of this report presents a detailed explanation of each of the elements required to compute the dollar benefits accruing to the EPP/DVU system for new applications and redetermination cases. Included are discussions of how one estimates the number of months that a case can be expected to remain on the Medicaid rolls, the average monthly payments to such cases, and the (incremental) number of case equivalents kept off or forced off the rolls through the EPP/DVU corrective action system. Also included are discussions of the most appropriate way to discount a future benefit stream that may stretch over years to a single present value in the current year, and an analysis of the impact of various uncertainties resulting from reliance upon statistical samples.

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[1] Maximus, Inc., a contractor to the N.H. Title XIX Project, developed an algorithm to compare dollars <u>misspent</u> and <u>potentially saved</u>, by reviewing cases found ineligible due to excess resources over a six-month period. The finding was that savings approximate 41 percent of dollars misspent. However, the algorithm was not intended to deal with the much-longer time frames under discussion here; and Maximus, Inc. concurs with Vance Industries' judgment that the 41 percent estimate is inappropriate for use in this circumstance.

2.2 Detailed Analysis of Benefits

2.2.1 Introduction

In calculating the benefits of applying the EPP/DVU system, we have estimated the number of ineligible cases for whom New Hampshire would have been paying benefits except for the presence of the system, multiplied this number by the estimated time that these cases would have remained on the rolls had their errors not been detected, multiplied the product by the average amount of money paid each month to cases that the New Hampshire DVU actually found to be in error, and determined the present value for the resulting number. The methods of calculation employed and actual statistics produced by these calculations are presented below, first for redetermination cases, and then for new applications. Calculations are presented in the order in which they should be performed, rather than the more logical order presented above.

2.2.2 Estimated Benefits for Redetermination Cases

No one can predict how long an individual case would have remained on the rolls had a specific event not happened. The basic simplifying assumption that we made was to assume that each case where an error had been detected would have remained on the rolls for the same length of time as the average case that had already been on the rolls as long as the case in which the error was detected. This assumption is illustrated in Exhibit 2-1.

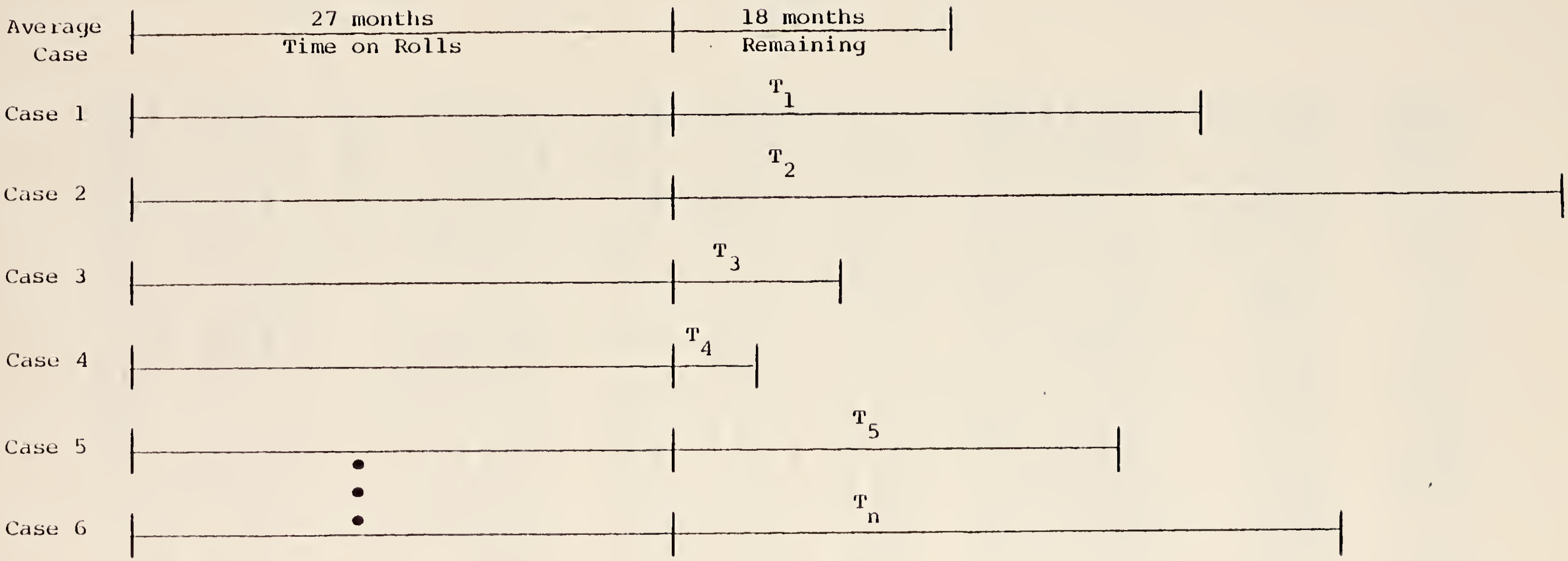
Given this assumption, we proceeded as follows:

Step #1: Assume that each error case that had been detected by the EPP/DVU system at redetermination time had been on the rolls for the average number of months that cases in error had been on the rolls prior to the DVU review.

New Hampshire Title XIX Quality Control Project staff have calculated this amount to be 27 months.

EXHIBIT 2-1

ILLUSTRATION OF "AVERAGE TIME REMAINING ON THE ROLLS"



Average time remaining on rolls = 18 months

$$18 \text{ months} = \sum_{i=1}^{n} \frac{T_i}{n}$$

Step #2: Calculate the average length of time that closed cases that have already been on the rolls for 27 or more months remain on the rolls.

Data provided by the New Hampshire Title XIX Quality Control Project indicate that the average time on the rolls for cases that have been on the rolls for at least 27 months is 45 months.

Step #3: Calculate the estimated time that a case found in error by the DVU would have remained on the rolls by subtracting the average amount of time such cases had been on the rolls at the time of detection (27 months) from the average length of time cases that were on the rolls at least twenty-seven months remained (45 months).

45 minus 27 is 18. We therefore assume that the redetermination cases would have remained on the rolls for 18 additional months.

Step #4: Assume that the average benefit payment paid in error in the first month to all cases caught in 1978 would be equal to the average monthly error payment as detected by the DVU in 1977.

New Hampshire Title XIX Quality Control Project staff have calculated this amount to be $94.68.

Step #5: Assume that average monthly Medicaid payments increase at a compound rate of 1 percent per month (see Appendix C); calculate the monthly payments for 18 consecutive months beginning with a monthly payment of $94.68.

These values are presented in Appendix C, Exhibit C-1.

Step #6: Discount the average cash value of dollars saved per error case (as found above in Step #5) to determine the present value of error payments saved per error case.

6A: Assume the appropriate discount rate is the current rate for a short-term obligation of the State of New Hampshire.

State of New Hampshire officials have informed Vance Industries that the most recent rate for a 3-year, $2 million bond was 5.25% annually.

6B: Because Medicaid payments are made on a monthly basis, the discounting period will be one month. Convert the annual bond interest rate of 5.25% to a monthly rate.

The monthly equivalent of 5.25% is .4375%.

6C: Determine discounted present values of future payments according to the formula:

$$PV = \frac{\text{future cash payment}}{(1 + i)^n}$$

where PV = the present value of each future monthly case payment
i = the monthly interest rate = .4375%
n = the number of monthly periods discounted, from 1 to 18.

These values appear in Column (4) of Exhibit C-1, Appendix C.

6D: Determine the present value of the future stream of benefits.

Add results in Column (4) of Exhibit C-1, Appendix C from the first through 18th periods to arrive at a <u>present value of future benefits associated with each redetermination error case caught of $1693.88</u>.

Step #7: Estimate the (incremental) number of redetermination error case equivalents that the EPP/DVU system would eliminate from the rolls annually.

7A: Assume that the number of redeterminations in 1978 is equivalent to the total number of cases on the rolls minus the number of new applications.

The latest available case data (from October 1, 1978) reveals that there were 10,149 MA only, non-money payment cases. Furthermore, there were 2,957 new Medicaid applications in New Hampshire in the fiscal year ending June 30, 1978.

Therefore, we assume that an EPP/DVU system would have reviewed 7,192 cases in 1978.

7B: Determine the extent to which the EPP/DVU System lowered error rates.

The Vance Industries, Inc. impact analysis of the EPP/DPU system used a "difference of improvements" approach to estimate that the system among redetermination cases resulted in 7.77% fewer errors than would have been expected if routine review procedures had been used.

7C: Determine the case-equivalent number of eliminated redetermination cases by multiplying the reduction rate times the base number.

7.7% of 7,192 cases is 559 cases.

Step 8: Estimate the present value of benefits associated with all redetermination error cases caught by the DVU.

Multiply $1693.88 savings/case x 559 cases = $946,879.

Therefore, we conclude that the estimated maximum benefits associated with the EPP/DVU system for redetermination cases in New Hampshire in 1978 are $946,879. As will be discussed in Appendix A, we believe that the actual benefits are somewhat less than this because of the likelihood that some of those judged ineligible change their circumstances, re-apply and (appropriately) begin receiving benefits.

2.2.3 Estimated Benefits for New Applications Cases

The steps to be taken to calculate the benefits that accrue by applying the EPP/DVU system to new applications cases are directly analogous to those for redeterminations. The actual numbers that must be used, however, are different. A brief summary of these steps appears below.

Step #1: Assume that the average new application case that has been detected to be in error would have remained on the rolls as long as the average (new application) case where no error has been detected.

The New Hampshire Title XIX Quality Control Project staff have informed us that the average New Hampshire Medicaid case remains on the rolls for 27 months.

Step #2: Calculate the length of time that new application cases have already been on the rolls.

By definition, new application cases have been on the rolls for 0 months.

Step #3: Calculate the estimated time that a new application case found to be ineligible would have remained on the rolls by subtracting the average length of time such cases have been on the rolls (0 months) from the average total time on the rolls (27 months).

The calculation yields 27 months. We thus assume that new application error cases would have remained on the rolls for 27 months, if not caught by the DVU.

Step #4: Estimate the incremental number of new application error case equivalents that the EPP/DVU system would eliminate from the rolls annually.

4A: Determine the number of new application cases in 1978.

New Hampshire Title XIX staff informed Vance Industries, Inc. that there were 2957 new application cases in fiscal 1978.

4B: Determine the extent to which the EPP/DVU system lowered error rates among new application cases.

The Vance Industries, Inc. impact analysis of the EPP/DVU system used a "difference of improvements" approach to estimate that the system resulted in 13.76 percent fewer errors among new application cases than would have been expected if routine review procedures had been used.

4C: Determine the number of eliminated new application error case equivalents by multiplying the base number of cases times the percentage reduction in errors.

13.6 percent of 2,957 cases yields 407 cases.

Step #5: Assume that the average benefit payment paid in error in the first month to all cases caught in 1978 would be equal to the average monthly error payment as detected by the DVU in 1977.

New Hampshire Title XIX Quality Control Project staff have calculated this amount to be $94.68.

Step #6: Assume that average monthly Medicaid payments increased at a compound rate of 1 percent per month (see Appendix C); calculate the monthly payments for 27 consecutive months beginning with a monthly payment of $94.68.

These values are presented in Appendix C, Exhibit C-1.

Step #7: Discount the average cash value of dollars saved per error case (as found above in Step #6) to determine the present value of error payments saved per error case.

7A: Assume the appropriate discount rate is the current rate for a short-term obligation of the State of New Hampshire.

State of New Hampshire officials have informed Vance Industries that the most recent rate for a 3-year, $2 million bond was 5.25% annually.

7B: Because Medicaid payments are made on a montly basis, the discounting period will be one month. Convert the annual bond interest rate of 5.25% to a monthly rate.

The monthly equivalent of 5.25% is .4375%.

7C: Determine discounted present values of future payments according to the formula:

$$PV = \frac{\text{future cash payment}}{(1 + i)^n}$$

where PV = the present value of each future monthly cash payment

i = the monthly interest rate = .4375%

n = the number of monthly periods discounted, from 1 to 27.

These values appear in Column (4) of Exhibit C-1, Appendix C.

7D: Determine the present value of the future stream of benefits.

Add results in Column (4) of Exhibit C-1, Appendix C from the first through 27th periods to arrive at a present value of future benefits associated with each new application error case caught of $2653.78.

Step #8: Estimate the present value of benefits associated with all new application error cases caught by the DVU.

Multiply $2,653.78 savings/case x 407 cases = $1,080,088.

EXHIBIT 2-2

ESTIMATED MAXIMUM TOTAL DOLLARS WHICH COULD ACCRUE TO THE STATE RESULTING FROM IMPLEMENTATION OF EPP/DVU SYSTEM

	Average Number of Months on Rolls −	Number of Months Already on Rolls =	Months Remaining[3]	Monthly Payment[4]	Number of Case Equivalents[5]	Present Value at .4375%[6]
Redetermination Cases	45[1]	27[2]	18	$ 94.68	559	$946,879
New Application Cases	27[7]	0	27	$ 94.68	407	$1,080,088
					TOTAL SAVINGS	$2,026,967

[1] 45 Months = The average time those cases remain on the Medicaid rolls for all cases which have been on the rolls at least 27 months.

[2] 27 Months = The average number of months an error case has been on the rolls as determined by the EPP/DVU System.

[3] Months Remaining = The number of months an ineligible case would remain on the rolls without having the EPP/DVU System.

[4] Monthly Payment = The average monthly payment made to those cases found in error by the EPP/DVU System. The base figure shown compounds at 1% per month (see Appendix C, Exhibit C-1).

[5] Case Equivalents = The increased number of cases found ineligible because of the EPP/DVU System.

[6] Present Value = The value today of a future stream of dollar savings resulting from the EPP/DVU System.

[7] 27 Months = The average length of time all cases have been on the rolls.

2.3 Intangible Benefits

The analysis of benefits thus far has been concerned solely with the principal tangible benefit of the error-prone profile/ Data Verification Unit technique: the reduction of dollars mis-spent in Medicaid payments. It has been recognized that some (undetermined but substantial) portion of this reduction of mis-spent funds will actually end up as dollars saved.

In addition to tangible benefits--those that can be valued--intangible benefits also exist. Intangible benefits have some recognized value, but cannot be assigned a specific value. Supplementing net cost savings, we have identified five other benefits, each of which is at least partially intangible:

- Improved Medicaid administration in New Hampshire;
- Improved capacity of District Offices;
- Improved administration of similar programs;
- Improved Medicaid administration in other states;
- Advancement of research capability.

The following paragraphs briefly describe each of these benefits. Because our basic methodology assumes that the EPP/DVU system has been developed in another state and then transferred for use in New Hampshire (for which data on costs and cost savings are available), we have described intangible benefits as if New Hampshire is the first "additional" post-Project state.

Improved Medicaid Administration in New Hampshire. To the extent that eligibility errors can be reduced by the EPP/DVU system, administration of the Medicaid program in New Hampshire would more closely follow the program's legislative intent and regulations put forth by both HEW and the State. This benefit encompasses the proper increase or addition of payments when called for by regulation, as well as reduction of payments and elimination of payments to ineligibles. (Currently, only two percent of errors in the New Hampshire Medicaid program are underpayment errors.) Because approximately fifty-five to sixty percent of the number of errors committed are administrative

errors (as opposed to client or provider errors), it is evident that the impact of improved administration may be significant. Other benefits that may accrue from improved administration include lower administrative costs, better service to clients, greater worker satisfaction, and so forth.

Improved Capacity of District Offices

EPP/DVU experience may be expected to increase the capabilities of District Office staff, especially with regard to Medicaid eligibility determination. Armed with knowledge of error-prone case types and other information provided by the EPP/DVU system, DO staff may be able to perform more effectively, even with no supplemental budget or staff to assist them.

Improved Administration of Similar Programs

The State of New Hampshire would be able to increase the benefits of the EPP/DVU system by applying results to similar State programs.

Improved Medicaid Administration in Other States

To the extent that improvements engendered by the system are transferred again to other States, benefits of the EPP/DVU approach would be even more widespread, by creating similar benefits in other State Medicaid programs. (Application of results to related programs by other States might occur, but should conservatively be estimated to occur only after a State has adopted EPP/DVU techniques in its own Medicaid program.)

Advancement of Research Capability

Apart from specific benefits arising from improvements to Medicaid and other similar programs, benefits may accrue to the State and others by virtue of the development and testing of research methods used for the EPP/DVU system.

The last of these has no direct connection with program administration, and thus no direct connection with cost savings. The other four are parts of the Medicaid program or similar programs. They are thus directly related to cost savings. For these reasons, four may be thought of as partly tangible, partly intangible benefits; while the last is purely intangible.

The most important aspect of intangible benefits is that their value depends on the objectives of the individual or organization doing the valuing. In other words, it is impossible to "correctly" value these benefits for any and all cases. There is no way to determine how important any attribute might be to another state implementing an EPP/DVU system in the future. It is possible that some of these benefits would be inconsequential to another state, but that state might also have other priorities of its own that would become additional intangible benefits for that particular case.

Because of these characteristics, intangible benefits cannot be assumed to have given values. But, when they are recognized as benefits, it is appropriate for the State in question to count the benefits it recognizes as important as greater than the sum of tangible benefits (cost savings). The extent to which the value of all such benefits exceeds cost savings depends on the objectives of each state implementing the system. Valuation of intangible benefits is thus achieved largely through a political process.

CHAPTER 3

COST OF THE ERROR PRONE PROFILE/DATA VERIFICATION UNIT SYSTEM

Chapter 3

COST OF THE ERROR-PRONE PROFILE/DATA VERIFICATION UNIT SYSTEM

3.1 Introduction and Overview

3.1.1 Approach to Cost Estimation

This section of the analysis deals with estimated costs of an Error-Prone Profile/Data Verification Unit (EPP/DVU) operation. The conceptual model emphasizes the DVU as an ongoing activity rather than a demonstration. Consequently, some of the substantial development costs incurred by the New Hampshire Title XIX Project are not reflected because they would not be incurred in other states adopting the technique. Concern here is with the costs of transferring and operating the DVU, but not with initial development of profiles and other research-related costs.

To approximate the costs that might be incurred by another state in adopting the DVU concept and operation, it has been necessary to rely as much as possible on known costs. We have approached the issue of transfer costs by asking the following hypothetical question:

> What would be the costs of implementing an EPP/DVU operation in New Hampshire, if it had been developed in another State?

Approaching the problem in this way allows New Hampshire cost estimates to be made of each activity. Where costs--for example, of staff at a given skill level--might differ for another State, revised unit costs must be substituted. Because some costs will differ according to program scale, we have provided in Appendix

B some guidelines for varying estimates of numbers of staff required for States with different Medicaid caseloads.

Exhibit 3-1, which immediately follows this introduction, provides a Summary of Costs of the EPP/DVU operation. This exhibit identifies all costs as either fixed or variable costs. Each category of cost shown in the Summary of Costs is explained more fully below. In these explanatory materials, numerous references are made to costs associated with various sections of the New Hampshire Division of Welfare. It is recognized that the precise titles of these sections will vary from State to State, but the functions they perform should provide a sufficiently clear basis for substituting the proper organizational titles used by another State.

In developing our cost estimates, we have differentiated between the first operating year of the EPP/DVU system and a prototypical "succeeding year," for two reasons. First, the system will of necessity incur start-up costs in Year 1 that will not be repeated. Second, the level of activity will be relatively low in the first year--because full staff will not be hired and operations underway until approximately Month 5. We have reflected this lower activity by reducing all variable costs in Year 1 by one-third of their uninflated "succeeding year" level.

3.1.2 Assumptions

In order to derive reliable cost estimates, a number of additional assumptions were made involving the number of cases judged to be error prone, the extent to which the Data Verification Unit could be paid out of an existing Welfare Division budget, and the impact of inflation upon costs of the EPP/DVU system if it were implemented in the future.

Number of Error Prone Cases

The costs of operating an EPP/DVU system are obviously related to the number of cases judged to be error prone, and hence, the number of cases which must be subjected to additional

intensive review. The cost estimates in this analysis are based upon an assumption of roughly 1600 error prone cases within a one year period, i.e., the same number of cases that were actually encountered by New Hampshire staff when the EPP/DVU system was pilot tested. The estimate of 1600 cases is based upon a caseload of approximately 8000 that was in effect during the demonstration, and the selection of a set of profiles that delineated 19% of the caseload as error prone. Roughly speaking, the variable costs associated with an EPP/DVU system would increase in proportion to the number of cases fitting the definition of error prone. Higher numbers of error prone cases could result from a larger overall caseload, selection of profiles that fit more than 19% of the cases, or a combination of the two.

Funding of the DVU

In the New Hampshire demonstration project, the DVU was staffed by hiring new welfare workers over and above those that were already working in the State and District Offices. Thus, all DVU costs represented additional costs to the Welfare Division.

It is by no means obvious that this needs to be done. A State adopting the EPP/DVU system might reallocate its existing welfare eligibility staff time to spend less time on non-error prone cases, thereby freeing up the resources to staff a DVU at little or no additional costs.

In making our cost estimates, we have, however, made the most conservative estimates possible, i.e., that the State would not try to staff the DVU using current employees, and thus the costs of staffing a DVU would all be additional costs to the State.

Impact of Inflation

All cost estimates in this analysis are based upon an assumption that the EPP/DVU system were being introduced into New Hampshire today, i.e., in 1978. Inflation can affect the cost projections that we are making in two ways. First, all

activities taking place in years after the first one could be expected to be more costly due to increases in staff salaries and other costs. Secondly, if the EPP/DVU system were implemented in years later than 1978, all costs (including first year costs) would be greater than would otherwise occur if the project were initiated in 1978.

We have adopted several ways of dealing with this set of major uncertainties. First, in order to simplify comparisons of the levels of activities that must take place in the first and succeeding years, we have chosen to stress current (1978) dollars in the Summary of Costs in Exhibit 3-1. Thus, Columns (1) and (2) in the Summary of Costs are useful because they allow comparison of estimated Year 1 and Year 2 costs--as if Years 1 and 2 occurred simultaneously with no time for inflation to increase costs. This is obviously unrealistic, however, so we have also provided Column (3). Column (3) is merely a restatement of Column (2) with all costs inflated by 5.5 percent.* Column (3) thus represents estimated costs of operating the EPP/DVU a year from now, that is, in 1979-80, based upon a 5.5% inflation rate.

3.1.3 Cost Estimate

As is shown in Exhibit 3-1, the above-described methodology and assumptions yield a total estimated cost of $223,534 during the first year of implementing an EPP/DVU system in New Hampshire, and a (constant dollar) cost of $280,212 in the second and succeeding years. Assuming a 5.5% inflation rate, the Year 2 costs would rise to $295,625.

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*At current increases in the cost of living, 5.5% is a conservative inflation factor. It was selected because one of the proposed federal guidelines for cost-of-living increases to salary scales is 5.5 percent. Since the costs of a EPP/DVU system are largely salaries, and since the system would be operated in the public sector (and would perhaps include funding from DHEW), the 5.5 percent factor is not considered unreasonable.

The discussion of individual cost elements in the remainder of this analysis provides further guidance about ways in which these cost estimates should be modified for other States. The potential variances in staff costs are addressed in Appendix B.

EXHIBIT 3-1

TOTAL COSTS = FIXED COSTS + VARIABLE COSTS

	(1) Year 1 Cost in 1978 $	(2) Year 2 Cost in 1978 $	(3) Column (2) plus 5.5%
Fixed Costs	$ 61,348	$ 26,932	$ 28,414
Start Up Costs			
Reprogram Computer Software	19,500	-	-
Develop DVU Organization	1,917	-	-
Support Service-Staff Training	10,039	7,500	7,913
Equipment	10,460	-	-
Annual Costs			
General Program Administration	3,421	3,421	3,609
Develop/Revise Error-Prone Profiles	2,974	2,974	3,138
Support Service - Medicaid Quality Control Staff	5,233	5,233	5,521
Support Services - All Other	7,804	7,804	8,233
Evaluation	-	10,000	10,550
Variable Costs*	162,186	243,280	256,661
Match Cases to Error-Prone Profiles	7,283	10,925	11,526
Review Error-Prone Cases	135,853	203,780	214,988
Charges for Billed "Outside" Verifications	200	300	317
Other Direct Costs and Overhead	18,850	28,275	29,830
TOTAL COST	223,534	280,212	295,625

*Column (2) represents variable costs in 1978 dollars for a normal operating year. Reduced by one-third for Year 1 estimates.

3.2 Detailed Cost Analysis

3.2.1 Explanation of Fixed Costs

Fixed costs are the costs of establishing and maintaining the error-prone profile (EPP) and the Data Verification Unit (DVU) that are essentially unrelated to the scale of ongoing DVU operations. Two kinds of fixed costs are recognized: start-up costs and annual costs. Start-up costs are self-explanatory. Annual costs include routine program maintenance and the indirect costs of services rendered to the DVU by other State government agencies.

3.2.1.1 Reprogram Computer Software for Different Operating Systems (O/S)

This activity is required to convert existing software--the program that generates error-prone profiles from the MQC data base. The conversion is necessary only to make the existing program compatible with another state's o/s. It is not a revision or improvement of the program. The existing program was written in FORTRAN for the Honeywell 6000 used by the New Hampshire Department of Centralized Data Processing.

Limited reprogramming will be necessary to convert the software for an o/s other than Honeywell with a FORTRAN compiler. If the proposed o/s has no FORTRAN compiler, it is estimated that professional time required to accomplish the conversion will approximately triple.* Moreover, if the State adopting the EPP/DVU system has its own variables and/or data entry formats, the input routines would also have to be reprogrammed.

Experience with the New Hampshire project indicates that this one-time cost should be contracted out because of its short-term nature. The following cost-estimates are based on the

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*These estimates were provided by Maximus, Inc., a contractor to the N.H. Division of Welfare in the development of error-prone profiles.

conservative assumption that the proposed o/s has no FORTRAN compiler. If the proposed o/s has a FORTRAN compiler--as most do--the estimate of programmer time can be reduced by two-thirds or more. Machine costs are expected to remain fairly constant regardless of whether the proposed o/s has a FORTRAN compiler.

1. Contractor costs:

a.	Professional Services 70 days @ $250	$17,500	
	1) Programmer Time		15,500
	2) Computer Costs		2,000
b.	Per Diem, 50 @ $40	2,000	
		$19,500	

To separate computer costs from personnel costs in this estimate, note that a single run of the profile-development program (an 1800 statement program written in FORTRAN) is estimated to cost $150 in computer charges, assuming the run contains about 300 cases. During the software programming, it is reasonable to assume that about ten test runs would be made with no cases, to determine whether the revised program will compile; and that another ten test runs with 300-500 cases each would be necessary to test whether the revised program will develop statistics as intended. It is likely that these twenty runs would cost a total of about $1,250; allowance of $2,000 in computer costs would be ample.

Subtracting computer costs and per diem allowance from estimated contractor costs leaves $15,500 and 70 days, or about $221 per day. If the proposed State's o/s has a FORTRAN compiler, the required professional programming costs could be substantially reduced, perhaps to as few as five or six days--assuming that the data input formats are identical to the ones programmed. Allowing 20 days as a conservative "low" estimate, programming would cost $4,420 at $221 per day. If programming services can be obtained at lower cost per day, costs of this service can be further reduced.

NOTE: If the proposed o/s is a Honeywell 6000 or equivalent, this cost will not be incurred because reprogramming is not needed. If the o/s is changed or upgraded at a future date, reprogramming may be necessary at that time to make this software compatible with the new o/s.

3.2.1.2 Developing the DVU Organization

The function performed by this activity is that of initial staffing of the DVU. It consists of two sub-activities: hiring the DVU Manager; and hiring the remainder of the DVU staff. The former sub-activity is performed by the Division of Welfare (or equivalent), and its cost is considered a support cost to the DVU. Support costs are estimated in Section 3.2.1.3 described below.

The second sub-activity is performed by the DVU Manager, after the Manager has been hired. Hiring the DVU staff is a direct cost to the DVU. The cost involved is a portion of the DVU Manager's annual salary and fringe benefits. (Other associated costs, such as telephone, postage, etc., are included as Overhead. Overhead costs are detailed in Section 3.2.2.4.) One month of the DVU Manager's time has been allocated to staffing the DVU in the first year only.*

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of time	Cost
1	DVU Manager	$23,000	8.33	$1,917

3.2.1.3 Support Services

This category of cost includes those fixed costs related to the DVU but incurred outside and charged to the DVU. Four general categories of support services are recognized: initial staff training, Medicaid Quality Control Staff, other support services, and additional support from consultants.

*The staff complement of the New Hampshire DVU, as well as salaries for all positions, is summarized in Appendix B.

1. Initial DVU Staff Training

This activity provides for training of reviewers and supervisors in the specific purposes and practices of the DVU. Training will be provided by the training staff within the Division of Welfare, supplemented by the DVU Manager (a direct cost). An estimated three weeks of preparation time, plus one week of actual training, will be required of one training leader and each of two assistants.

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of Time	Cost
1	Training Leader	$18,400	8.33	$1,533
2	Training Assistants	$12,075	8.33	$1,006
				$2,539

2. Division of Welfare Medicaid Quality Control Staff

The Medicaid Quality Control Staff performs routine case reviews. The results of their work are contained in the Medicaid Quality Control (MQC) data base, which is also the source of error-prone profiles for the DVU. Results of QC reviews are recorded on worksheets. To use the data for EPPs, the worksheets must be upgraded so the information they contain can be coded for keypunching and computer entry in the EPP program. The upgrading and coding are performed by a Statistician/Coder on the Medicaid Quality Control staff. Upgrading and coding of data on 400 cases requires slightly less than one-half a person-year.

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of Time	Cost
1	Statistician/ Coder	$10,465	50	$5,233
				$5,233

3. Other Support Services

This category of cost includes the various support services received by the DVU other than services already referred to. The various services are considered as a group because funds to pay for them are derived according to a cost allocation plan for indirect costs; and cost allocation formulae are based on percentages of direct costs, rather than actual computation of the value of each support service.

Support services include the following*:

from the Division of Welfare:	Director's Office Deputy Director's Office Claims Processing Section (keypunching) Management Information Systems Sec. Xerox/copier service (staff) Fair Hearings
from the Department of Health & Welfare (i.e., umbrella agency)	Commissioner's Office Development/implementation of DVU policies, regulations
from other State Departments:	Accounting Attorney General's Office Mail Room Personnel All other support costs

The costs of these support services are estimated by the former New Hampshire DVU Manager at three percent of DVU Direct Costs.

DVU Direct Costs = Salaries + Other Direct Costs + Overhead

--Salaries (from Appendix A) = $220,800

--ODCs = Equipment (Section 3.2.1.4, below) + Profile Revision Computer Costs (Section 3.2.1.6, below) + Costs billed from other organizations (Section 3.2.2.3, below) = 10460 + 300 + 300 = 11060.

--ODCs + (from Section 3.2.3.5, below) = $28,275

DVU Direct Costs = $260,135

Support service allocation @ 3% of DVU Direct Costs = $7,804

*All support costs are indirect costs, from outside the DVU. These activities may also include DVU staff, but their participation and cost is already reflected in their salaries, which are charged in full to the DVU.

4. Additional Consultant Support

Given the novelty of the EPP/DVU approach, it seems reasonable to expect that it will be necessary to hire an outside contractor to provide additional training to State data processing and other staff in the use of the programs and/or profiles.

Conservatively, these and related outside consultant costs would include at least 25 to 30 days at $221 per day plus $40 per diem. Some States with sophisticated computer services staff might require only a fraction of these costs. But in order to be safe, we have allocated $7500 for this purpose.

3.2.1.4 Equipment Inventory

The following equipment has been judged necessary for the DVU staff. Only basic items for exclusive use by DVU staff are included. It is assumed that shared items such as copiers, meeting room tables and chairs, etc., will be available through the pre-existing facilities of the Division of Welfare. (All prices quoted are those supplied by the State of New Hampshire Division of Purchase and Property.)

ESTIMATED DVU EQUIPMENT INVENTORY

21	Executive Desks @ $196	$4,116.00
21	Executive Chairs @ $83	1,743.00
1	Secretarial Desk @ $258	258.00
1	Secretarial (posture) Chair @ $72	72.00
5	five-drawer file cabinets (legal size) @ $131	655.00
3	Credenza Bookcases @ $104	312.00
2	Standard Bookcases (42" x 72")@ $103	206.00
1	Desk Calculator @ $159	159.00
2	Adding Machines @ $100	200.00
2	Office Electric Typewriters @ $702	1,404.00
2	Blackboards 36" x 60" or 48" x 72" @ $42	84.00
2	Bulletin Boards 36" x 60" or 48" x 72" @ 42	84.00
22	Trash Baskets @ $2.31	51.00
1	Coat Rack @ $78	78.00
2	Supply Cabinets @ $204	408.00
21	Pocket Calculators @ $30	630.00
	TOTAL	$10,460.00

3.2.1.5 General Program Administration

This activity recognizes the DVU staff time that must be spent to maintain normal program operations. Activities include liaison with budget authorities within the State structure, coordination with other sections of the Division of Welfare, general correspondence, etc.

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of Time	Cost
1	DVU Manager	$23,000	10	$2,300
1	Clerk/Typist	7,475	15	$1,121
				$3,421

3.2.1.6 Development and Annual Revision of Error-Prone Profiles

In the first year of the DVU, initial error-prone profiles (EPPs) are developed from the MQC data base. Each succeeding year EPPs are revised using MQC data based on experience of the DVU during the past year. The result is a more appropriate set of profiles for use in the succeeding year. Direct costs to the DVU are outlined below. Support services, provided by the Division of Welfare Medicaid Quality Control staff, were described above in Section 3.2.1.2

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of Time	Cost
1	DVU Manager	$23,000	10	$2,300
1	Clerk/Typist	7,475	5	$ 374
				$2,674

Computer Costs:	2 test runs @ $150	$ 300
	TOTAL COST	$2,974

3.2.1.7 Evaluation

A State implementing the EPP/DVU system will wish to periodically assess whether or not the system is meeting its stated objectives, reasons why shortfalls may be occurring, and whether or not the system should be modified or improved to meet changing program or agency objectives. This periodic assessment may be carried out by the EPP/DVU Manager, others in the Welfare Division or by outside university groups or consultants. If the State decides to use existing resources, it is possible that this evaluation could take place at no extra cost. If the State chooses to use outside evaluators, a modest cost increment would be involved. In New Hampshire, an outside firm was selected through competitive bidding and carried out its responsibilities for approximately $10,000 per year. Therefore, in order to be conservative, we are assuming an incremental cost of $10,000 for evaluation/assessment of the new system.

Although the evaluation/assessment should begin during the first year of the project, it should not be completed until after some results are in, i.e., during the second year. For the sake of simplicity, we have allocated all of these evaluation costs to the second year.

3.2.2 Explanation of Variable Costs

Variable costs are the costs of operating the DVU on an ongoing basis that vary with the size of the DVU staff and caseload. The activities covered consist mainly of matching cases against EPPs and reviewing error-prone cases. Additional costs include those billed from other organizations--principally banks, as service charges for verifying case resources; and associated overhead costs.

3.2.2.1 Match Cases to Error-Prone Profiles

This activity requires a small amount of each Reviewer's time per month. The New Hampshire Medicaid caseload of about 8,000 cases has been estimated to require about one full-time

equivalent (FTE) of Reviewer time annually for matching New Application and Redetermination Cases. Other staff time has been apportioned to this activity.

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of Time	Cost
1	Reviewer (FTE)	$9,775	100	$9,775
1	DVU Manager	$23,000	5	$1,150
				$10,925

3.2.2 Review Error-Prone Cases

After cases have been matched to profiles, they are reviewed. Each Reviewer can complete about 100 reviews/year. With a caseload of 8,000 and a set of profiles that fits about 19% of the cases, over 1500 cases will be reviewed each year; sixteen FTE Reviewers are thus required for case review in this situation. Other staff costs have been apportioned to this activity.

Staff Costs:

#	Position	Annual Salary + 15% Benefits	Percent of Time	Cost
16	Reviewer (FTE)	$9,775	100	$156,400
1	DVU Manager	$23,000	75*	$ 17,250
2	Supervisors	$12,075	100	$ 24,150
1	Clerk/Typist	$ 7,475	80	$ 5,980
				$203,780

*When adding all time allotments for the DVU Manager, it may at first appear that the total exceeds 100%. However, the Manager's responsibilities to develop the DVU organization (Section 3.2.1.2) occur only in Year 1. As explained in Exhibit 3-1, all listed staff commitments for variable cost activities (Section 3.2.2.1 and 3.2.2.2) are reduced by one-third for Year 1 to allow for start-up of operations. Thus, the DVU Manager's time is never proposed to exceed 100%.

3.2.2.4 Other Direct Costs and Overhead

Other direct costs and overhead expenses include rent, expendable supplies, travel, telephone, postage and copier charges. All these costs vary with caseload and scale of the DVU. Annual cost estimates for these items for a project similar in size to New Hampshire's are as follows:

RENT: $ 6,000

= 1,000 sq. ft. @ $6/sq. ft.

SUPPLIES: $ 1,200

= $100 average/month

TRAVEL: $12,000

= 80,000 miles in private cars @ $.15/mile

TELEPHONE: $ 4,000

= $333 average/month (Note: Assumes availability of in-state WATS)

POSTAGE: $ 4,200

= General annual allowance of $1,000 + 1,600 cases receiving DVU review @ $2/case

XEROX COPIES: 875

= 100 copies/day x 250 days @ $.035/page

TOTAL ESTIMATED OTHER DIRECT COSTS AND ANNUAL OVERHEAD:

$28,275

APPENDICES

Appendix A

SENSITIVITY OF ESTIMATES TO UNCERTAINTIES IN KEY DETERMINANTS OF BENEFITS

A.1 Uncertainties in Whether and to What Extent Cases Forced Off the Rolls Later Reappear

The results of the potential dollar savings which would accrue to the State by the operations of the EPP/DVU system presented thus far have assumed that when an error is discovered, the circumstances of the client remains the same; that is, the client remains ineligible. However, these would-be dollar savings are not a completely accurate assessment because it is conceivable that clients whose income or resources are judged too high for continued Medicaid eligibility may act to change their income or resources and return to the rolls. For example, suppose a client is found to have excess resources. He/she may simply spend the excess money and then have his/her "countable resources reduced to the level that restore Medicaid eligibility." It is also possible that clients could return to the Medicaid rolls through errors in future application eligibility determination. Appropriate reapplication data are not available, given time and resource constraints, to estimate the savings reductions of the amount of future payments which will go to clients ruled ineligible after they change their circumstance and become eligible.

A.2 Uncertainties About Length of Time Cases Would Remain on the Rolls

The estimates presented in Chapter 2 above are based upon means. Thus, for example, it has been shown that the average time on the rolls for a sample of all Medicaid cases was 27 months.

Therefore, 27 months represents the best available estimate of the amount of time that cases remain on the rolls, but the laws of probability tell us that the sample mean may depart significantly from the population mean, i.e., the actual average time that all cases remain on the rolls.

In order to understand the impact of this uncertainty, Vance Industries has calculated 95% and 98% confidence limits around our estimates of 27 and 45 months on the rolls for all cases, and for cases that have been on the rolls for 27 months, respectively. Exhibit A-1 below presents the ranges of these statistics and hence the impact of this uncertainty on estimated benefits.

EXHIBIT A-1

Population Mean Deviations		
Confidence Level	New Application Cases	Redetermination Cases
95%	20 months	39 months
	27 months	45 months
	34 months	51 months
98%	19 months	37 months
	27 months	45 months
	35 months	53 months

As can be seen from the exhibit, the differences in average lengths of time a case remains on the rolls at the two levels of confidence are not slight. It is now possible to say, for example, that for those cases which have been on the rolls for at least 26 months, we can be 95% sure that they will remain on the Medicaid rolls anywhere, on between 39 and 51 months. Similarly, we can be 98% sure that they will remain on the rolls between 19 and 35 months. Clearly, it is therefore important to compute the "would be" dollar savings associated with each of these averages to show minimum and maximum accrued benefits. These computations are given in Exhibits A-2 and A-3. Summarized, these exhibits demonstrate that the activities of the Title XIX Quality Control Project in New Hampshire would yield, depending upon which confidence level is used, a total potential savings of between $1,825,402 and $3,822,063.

EXHIBIT A-2

RANGE OF ESTIMATED DOLLARS WHICH WOULD ACCRUE TO THE STATE RESULTING FROM IMPLEMENTATION OF EPP/DVU SYSTEM

Redetermination Cases

Confidence Level	Average Number of Months on Rolls —	Number of Months Already on Rolls =	Months Remaining x	Monthly Payment x	Number of Case Equivalents =	Gross Dollars	Present Value at 5/12%
95%							
	39	27	12	$141.68	559	$ 950,389	$ 925,141
	45	27	18	141.68	559	$1,425,584	$1,370,691
	51	27	24	141.68	559	$1,900,779	$1,805,257
98%	37	27	10	141.68	559	$ 791,991	$ 774,140
	45	27	18	141.68	559	$1,425,584	$1,370,691
	53	27	26	141.68	559	$2,059,177	$1,947,720

EXHIBIT A-3

RANGE OF ESTIMATED DOLLARS WHICH WOULD ACCRUE TO THE STATE RESULTING FROM IMPLEMENTATION OF EPP/DVU SYSTEM

New Application Cases

Confidence Level	Average Number of Months on Rolls —	Number of Months Already on Rolls =	Months Remaining x	Monthly Payment x	Number of Case Equivalents =	Gross Dollars	Present Value at 5/12%
95%	20	0	20	$141.68	407	$1,153,275	$1,104,324
	27	0	27	141.68	407	$1,556,922	$1,469,647
	34	0	34	141.68	407	$1,960,568	$1,824,487
98%	19	0	19	141.68	407	$1,095,611	$1,051,262
	27	0	27	141.68	407	$1,556,922	$1,469,647
	35	0	35	141.68	407	$2,018,232	$1,874,343

A.3 Uncertainties About the Appropriate Discount Rate

Given the current increases in interest rates, the 5.25% rate cited by the New Hampshire officials may seem to be an inappropriate guide for future estimates. Therefore, we have prepared a table that lists the impact upon the benefits if the rate rose from 5.0% to 6.0%.[1] As can be seen in Exhibit A-4, the impact of changing interest rates by 3/4% annually is relatively slight.

EXHIBIT A-4

DISCOUNTED PRESENT VALUE OF DOLLARS MISSPEND

New Application Cases

Average Months Remaining on Rolls = n = 27 Months

Discount Rate (%)		Present Value
Annual	Monthly	(of $1,556,922 undiscounted)
5.0	5/12	$1,469,647 *
6.0	1/2	$1,453,011*
5.25	.4375	$1,465,488**

*From compound interest tables
**Interpolation, for comparative purposes

Redetermination Cases

Average Months Remaining on Rolls = n = 18 Months

Discount Rate (%)		Present Value
Annual	Monthly	(of $1,425,584 undiscounted)
5.0	5/12	$1,370,691 *
6.0	1/2	$1,360,071 *
5.25	.4375	$1,368,036 **

*From compound interest table
**Interpolation, for comparative purposes

[1] Annual rates of 5% and 6% represent monthly rates of 5/12% and 1/2%, included in common compound interest tables. The actual annual rate of concern here, 5.25%, is a monthly rate of .4375%, which is not included in such tables.

EXHIBIT A-5

CALCULATION OF NUMBER OF CASES ON WHICH PAYMENTS ARE SAVED

A. Total New Hampshire Medicaid Caseload on October 1, 1978: 10,149*

New Applications: 2,957 *

Redeterminations: 7,192

B. Improvement in Performance of DVU vs. Routine Review**

New Applications: 13.76%

Redeterminations: 7.77%

C. Number of Cases on Which Payments Are Saved

New Applications: 2957 x 13.76% = 407 cases

Redeterminations: 7192 x 7.77% = 559 cases

*New Hampshire Division of Welfare

**Vance Industries, Inc., Impact Evaluation of the New Hampshire Title XIX Quality Control Demonstration Project (September 8, 1978), Exhibit 2-3 and related text.

EXHIBIT A-6

SUMMARY CALCULATION OF UNDISCOUNTED SAVINGS
REDETERMINATION CASES

Confi-dence Levels	Average Months on Rolls	—	Number of Months	=	Months Remaining		Monthly Payment		Number of Cases		Total
95%	39		27		12	x	$141.68	x	559	=	$ 950,389
	45		27		18	x	141.68	x	559	=	$1,425,584
	51		27		24	x	141.68	x	559	=	$1,900,779
98%	37		27		10	x	141.68	x	559	=	$ 791,991
	45		27		18	x	141.68	x	559	=	$1,425,584
	53		27		26	x	141.68	x	559	=	$2,059,177

EXHIBIT A-7

SUMMARY CALCULATIONS OF UNDISCOUNTED SAVINGS

NEW APPLICATION CASES

New Applications	Months on Rolls	Number of Months	Months Remaining		Monthly Payment		Number of Cases	Total
95%	20	0	20	x	$141.68	x	407	$1,153,275
	27	0	27	x	141.68	x	407	$1,556,922
	34	0	34	x	141.68	x	407	$1,960,568
			20	x	173.15	x	407	$1,409,441
			27	x	173.15	x	407	$1,902,745
			34	x	173.15	x	407	$2,396,050
98%	19		19	x	141.68	x	407	$1,095,611
	27		27	x	141.68	x	407	$1,556,922
	35		35	x	141.68	x	407	$2,018,232
			19	x	173.15	x	407	$1,338,969
			27	x	173.15	x	407	$1,902,745
			35	x	173.15	x	407	$2,466,522

A.4 Uncertainties of Potential Variations in Other States

All preceding figures are based upon statistics from New Hampshire. Those in other States must, therefore estimate how their own statistics would vary from New Hampshire statistics. Once this is done, we can offer the following guidelines.

Length of Time on Rolls

Estimated benefits of the EPP/DVU system would be greater than those for New Hampshire to the extent that error cases remain on the rolls longer than in New Hampshire; symetrically, estimated benefits would be lower if time on the rolls decreases.

Size of Benefits

Estimated benefits to the EPP/DVU system would be greater than New Hampshire's to the extent that payments to error cases are greater than those in New Hampshire; estimated benefits would be less as average payments to error cases decreases.

Efficiency of the Profile

Estimated benefits to the EPP/DVU system would be greater than New Hampshire's to the extent that the profiles used were more efficient, i.e., that they uncovered a higher proportion of cases that were in fact in error. Conversely, less efficiency profiles would yield lesser benefits.

Size of Caseload Affected by DVU

Benefits described here are directly related to the total number of cases affected by the DVU. To the extent that the caseload of another state is larger or smaller, benefits resulting would also vary.

Relative Mix of New Applications and Redeterminations in Caseload

Total benefits described here are a sum of benefits resulting from more effective treatment of new applications cases and redetermination cases. Exhibit A-5 showed the increase in

efficiency of the DVU in dealing with each of these two groups of cases. Benefits in another state would vary not only with the variations in increased efficiency with new applications and redeterminations, but also with the relative proportions of these case types in the caseload.

For example, the New Hampshire profiles are considerably more efficient for new applications cases, but there are only one-third as many applications as redeterminations cases in the caseload. If there were a higher proportion of new applications, benefits would be even higher. Similarly, if the relative efficiencies of the profiles changed, benefits would also change.

Appendix B

DVU ESTIMATED STAFF REQUIREMENTS

The Data Verification Unit (DVU) described in this analysis is one staffed to adequately handle a Medicaid caseload similar in size to New Hampshire's current caseload--about 8,000 active cases and a set of profiles that meets about 19% of the cases. Caseloads in other states may differ substantially from this size and profiles may differ in the proportion of cases they "capture." This appendix describes staff functions in sufficient detail to allow adjustment of staff size of a proposed EPP/DVU system in another State.

The following list details DVU staff and costs needed for a project at the level of operations and pay scale employed in New Hampshire.

#	Position	Annual Salary	Benefits @ 15%	Annual Cost Per Person	Total Cost
1	DVU Manager	$20,000	$3,000	$23,000	$ 23,000
2	Supervisors	$10,500	$1,575	$12,075	$ 24,150
17	Reviewers	$ 8,500	$1,275	$ 9,775	$166,175
1	Clerk/Typist	$ 6,500	$ 975	$ 7,475	$ 7,475
					$220,800

The DVU Manager is the individual ultimately responsible for performance of the DVU. One Manager will always be required in a DVU.

Supervisors are the immediate supervisors of case Reviewers. Their job is to make certain that Reviewers are performing their tasks with adequate speed and accuracy. The New Hampshire experience shows that one Supervisor is required for approximately every eight to ten Reviewers.

Reviewers spend all their time matching individual cases to EPPs, and/or intensively reviewing those cases matching EPPs. Experience in the demonstration phase revealed that a Reviewer can review about 100 cases per year (or about 8.5 cases per month). Thus, the number of Reviewers required is directly related to the number of cases to be reviewed.

The number of cases to be reviewed is estimated by determining the size of the total active Medicaid caseload in a State and the statistic "p," the probability that a case will match an EPP. (The derivation of "p" in the New Hampshire demonstration project was fully described in the First and Second Year Reports.) In New Hampshire, it was determined during the demonstration that p = .19. In other words, 19 percent of all cases could be expected to match the set of EPPs that were employed. To find the total cases requiring review in a year, we multiply 8,000 cases times .19 = 1,520 cases.

Thus, since there are 1,520 cases to be reviewed, and each reviewer can review 100 cases per year, we find that 15.2 Reviewers are required. Practically speaking, this figure must be rounded up to 16 Reviewers.

In practice, each Reviewer also matches cases against EPPs. Matching is much less time-consuming than case review; but for purposes of cost estimation, it is easier to assume that Reviewers perform only the review function or the matching function, not both. The DVU Manager in New Hampshire estimates that one (1) additional Reviewer should be able to perform all required case matching for the other 16 Reviewers if employed full-time at case matching.

Consequently, we have allowed for one "full-time equivalent" (FTE) Reviewer to supplement the 16 Reviewers who theoretically spend all their time reviewing cases. As indicated above, in actual practice this means that 17 Reviewers would be required to both match and review error-prone cases.

Allowance has been made for one (1) Clerk/Typist. As the demonstration has been structured, the workload for this position does not vary (appreciably) with the number of cases reviewed. The reason for this is that much of the correspondence concerning any case under review is carried out using a series of form letters. Individually-typed letters to or about clients are the exception rather than the rule. The bulk of clerical work will be associated with case review, which is by far the most time-consuming DVU activity. However, other clerical responsibilities relate to general DVU administration and profile revision--activities that do not vary significantly because of changes in total caseload. In general, it is anticipated that the number of cases reviewed should more than double (increase by 125-150%) before a second full-time Clerk/Typist would be required. Part-time Clerk/Typist needs may be required when the number of cases reviewed by the DVU is less than this amount.

Appendix C

EXPANDED METHODOLOGY FOR COMPUTING DISCOUNTED PRESENT VALUE OF BENEFITS

Computation of the discounted value of benefits is complicated by the fact that the nominal face value of monthly benefits can be exptected to rise from month to month. The reason for this is that Medicaid payments are linked to actual medical costs rather than a pre-set scale of allowable benefits. Because medical costs regularly increase, it is necessary to allow for monthly increases in payments saved through use of the DVU. This contrasts with simpler present value benefit streams, whose face values remain constant from one discounting period to the next.

The problem of estimating reasonable monthly increases in medical costs has been approached by examining data from the Consumer Price Index compiled by the U.S. Bureau of Labor Statistics. In the CPI, the Medical Care Component has five sub-parts for different types of costs. The general Medical Care index was found to increase from 168.6 to 200.5 for the 29-month period of 1975 - May, 1977 (latest available data). (In the CPI, 1967 cost levels = 100.0.) This is a total change of 31.9 percent over 29 months, or about 1.1 percent per month. The figure was rounded down to 1 percent per month and used for benefit computations in the body of this report. See Exhibit C-1.

However, Medicaid costs are often linked to the more-rapidly-escalating medical costs and services. For this reason, we also examined the "Hospital semi-private room" sub-part of the Medical Care index. This is the most rapidly-increasing cost

component of the index. For the same time period (1975 - May, 1977), this sub-index rose from 236.1 to 295.9, an increase of 59.8--or about 2.06 percent per month. This figure was rounded to 2 percent.

The effect on present values of inflating monthly costs at a compound rate of 2 percent versus 1 percent may be seen by comparing the results of Exhibit C-1 with results of Exhibit C-2. <u>The 2 percent rate was not used in this report to compute benefits because this rate would increase benefits at a faster rate than the more conservative one percent estimate of medical cost increases</u>. However, the discounted present values given in Exhibit C-2 may easily be inserted into the appropriate portions of Chapter 2 of this report by those who wish to compare costs and benefits with an assumed 2 percent monthly increase in Medicaid payments. As is apparent from comparison of the exhibits, using the higher figure would increase estimated benefits by about 16%.

EXHIBIT C-1

PRESENT VALUE OF MONTHLY PAYMENTS OF $94.68 COMPOUNDED AT 1 PERCENT/MONTH AND DISCOUNTED AT .4375 PERCENT/MONTH

(n) Period	Cash $ Compounded @ 1%	PV Factor*	PVn
1	94.68	.995644	94.27
2	95.63	.991307	94.80
3	96.59	.986989	95.33
4	97.56	.982690	95.87
5	98.54	.978409	96.41
6	99.53	.974147	96.96
7	100.53	.969904	97.50
8	101.54	.965679	98.06
9	102.56	.961473	98.61
10	103.59	.957285	99.17
11	104.63	.953115	99.72
12	105.68	.948963	100.29
13	106.74	.944829	100.85
14	107.81	.940714	101.42
15	108.89	.936616	101.99
16	109.98	.932536	102.56
17	111.08	.928474	103.13
18	112.19	.924430	103.71
19	113.31	.920403	104.29
20	114.44	.916394	104.87
21	115.58	.912402	105.46
22	116.74	.908428	106.05
23	117.91	.904471	106.65
24	119.09	.900531	107.24
25	120.28	.896608	107.84
26	121.48	.892703	108.45
27	122.69	.888814	109.05

$$\sum_{n=1}^{18} PVn = 1{,}693.88 \times 559 \text{ cases} = \$946{,}879$$

$$\sum_{n=1}^{27} PVn = 2{,}653.78 \times 407 \text{ cases} = \$1{,}080{,}088$$

*PV factor = $(1 + i)^{-n}$

EXHIBIT C-2

PRESENT VALUE OF MONTHLY PAYMENTS OF $94.68 COMPOUNDED AT 2 PERCENT/MONTH AND DISCOUNTED AT .4375 PERCENT/MONTH

(n) Period	Cash $ Compounded @ 2%	PV Factor	PVn
1	94.68	.995644	94.27
2	96.57	.991307	95.73
3	98.50	.986989	97.22
4	100.47	.982690	98.73
5	102.48	.978409	100.27
6	104.53	.974147	101.83
7	106.62	.969904	103.41
8	108.75	.965679	105.02
9	110.93	.961473	106.66
10	113.15	.957285	108.32
11	115.41	.953115	110.00
12	117.72	.948963	111.71
13	120.07	.944829	113.45
14	122.47	.940714	115.21
15	124.92	.936616	117.00
16	127.42	.932536	118.82
17	129.97	.928474	120.67
18	132.57	.924430	122.55
19	135.22	.920403	124.46
20	137.92	.916394	126.39
21	140.68	.912402	128.36
22	143.49	.908428	130.35
23	146.36	.904471	132.38
24	149.29	.900531	134.44
25	152.28	.896608	136.54
26	155.33	.892703	138.66
27	158.44	.888814	140.82

$$\sum_{n=1}^{18} PVn = 1{,}940.87 \times 559 \text{ cases} = \$1{,}084{,}946$$

$$\sum_{n=1}^{27} PVn = 3{,}133.27 \times 407 \text{ cases} = \$1{,}275{,}241$$

V. RECOMMENDATIONS FOR IMPLEMENTATION

V. RECOMMENDATIONS FOR IMPLEMENTATION

In this chapter we present our ideas on how the system can be implemented State-wide in New Hampshire and by other States which are interested.

A. RECOMMENDATIONS TO DIVISION OF WELFARE

Since the research staff assigned to this project were separate from the mainstream of operations in the Division, this report conveniently serves as the forum for making our recommendations to the Director. During the month of February, a more detailed set of recommendations will be formulated along with an action plan for their implementation.

Several tasks remain to be accomplished before the system can be fully integrated into the State's operations. Each of these is discussed briefly below to provide an understanding of the scope of the effort required.

1. Convert System Software to Read All Quality Control Data

The Error Prone Profile System can be used on AFDC cases, Food Stamp cases, and Medicaid cases. Work is required to convert the data collected in the Quality Control Programs to a format read by the software. Currently, the programs read only the research data.

2. Integrate the System with EMS

The New Hampshire automated Eligibility Management System was developed during the course of this project. We believe the profile system should be made compatible with EMS and integrated

into the system as a subsystem. In this way, the computer could conduct the screening of the cases and display warning flags for each error prone case to the case technicians. In fact, information on the probable nature of the error could be displayed to facilitate the eligibility determination process.

3. Use Case Technician II's to Staff EVU's in Each of the District Offices

Case Technician II's are senior level eligibility technicians who may be able to be used to re-review the most error-prone cases. Or, they could be given primary responsibility to review the error-prone cases and have the other staff review the remaining cases. By creating an EVU at the District Office Level, special profiles can be developed to focus attention on unique problems in the District Office.

4. Establish an Office of Evaluation

An office of evaluation should be established to monitor the performance of the Error Prone Profile System in terms of costs and savings to the State. It could also signal when it is time to update the profiles, manage the automation of Quality Control data, operate the program to compute the profiles, and develop recommendations for corrective actions. Such an office could also help in the evaluation of other State programs such as AFDC and Food Stamps.

In order to carry out these recommendations, the Division would have to set up a special task force to implement the system. It is estimated that two to three persons, with some outside assistance, could complete the integration in four to five months.

B. RECOMMENDATIONS TO OTHER STATES

Part of the purpose of the cost benefit analysis was to provide other States with an estimate of how much it would cost to establish and operate an Error Prone Profile System. Therefore, we repeat an exhibit shown in Chapter IV that summarizes the cost of conducting 1600 Level 4 Reviews per year by a centralized Eligibility Verification Unit. Exhibit V-1 is presented on the following page. This exhibit shows that in the second year of full operation, the fixed costs of the EPPS would be about $27,000 and the variable costs $243,000, for a total of $280,000. Since Level 2 Reviews are less than half as costly, the same EVU could review over 3,200 cases using the Intensive Sequential Review Procedure.

The point is that the Vance Industries Report can provide an excellent framework for estimating the costs of implementation of the system. The individual cost estimates may vary considerably from State to State, however, depending on how each chooses to implement the system.

Our recommendations are as follows:

1. Assemble a Task Force to Study Implementation in Your State

   The commitment to proceed should be based on some clear idea of how the system is to function. The team should review the three reports issued as part of this project.

2. Contact Corrective Action Project (Health Care Financing Administration) for Technical Assistance

   Mr. Arthur Pergam, Acting Director of CAP, has agreed to consider requests for technical assistance from States.

Exhibit V-1

TOTAL COSTS = FIXED COSTS + VARIABLE COSTS

	(1) Year 1 Cost in 1978 $	(2) Year 2 Cost in 1978 $	(3) Column (2) plus 5.5%
Fixed Costs	$ 61,348	$ 26,932	$ 28,414
Start Up Costs			
Reprogram Computer Software	19,500	-	-
Develop DVU Organization	1,917	-	-
Support Service-Staff Training	10,039	7,500	7,913
Equipment	10,460	-	-
Annual Costs			
General Program Administration	3,421	3,421	3,609
Develop/Revise Error-Prone Profiles	2,974	2,974	3,138
Support Service-Medicaid Quality Control Staff	5,233	5,233	5,521
Support Services - All Other Evaluation	7,804	10,000	10,550
Variable Costs*	$162,186	$243,280	$256,661
Match Cases to Error-Prone Profiles	7,283	10,925	11,526
Review Error-Prone Cases	135,853	203,780	214,988
Charges for Billed "Outside" Verifications	200	300	317
Other Direct Costs and Overhead	18,850	28,275	29,830
TOTAL COST	$223,534	$280,212	$295,625

*Column (2) represents variable costs in 1978 dollars for a normal operating year. Reduced by one-third for Year 1 estimates.

The CAP is currently providing technical assistance in other areas which may be of interest. Mr. Pergan can be reached at (202) 472-5290.

3. <u>Contact Our Project Director in New Hampshire</u>

   Mr. Brian Cummings is durectly familiar with the operation of the system and can answer many of your questions. He can be reached at (603) 271-3691.

4. <u>Attend National Conference on Workload Planning Systems</u>

   On April 17-19, 1979, the Office of Family Assistance, SSA, is sponsoring a National Conference on Workload Planning Systems using error prone profiles. The New Hampshire system will be discussed in several workshops, along with systems from several other States.

   If the conference has already been held by the time this report is read, write to Maximus, Inc., Attention: Dr. David Mastran, 6723 Whittier Avenue, McLean, Virginia 22101, for a copy of the workshop training notebooks or for assistance in installing the system in your State.

Appendix A

<u>LISTING OF COMPUTER PROGRAM</u>
<u>FOR HONEYWELL 6600</u>

MAIN CALLING PROGRAM FOR ERROR PRONE PROFILE SYSTEM FOR NEW HAMPSHIRE

```
101 FORMAT(///' IF THIS IS A RESTART RUN, ENTER 1 AND HIT CARRIAGE
   & 'RETURN;'/' OTHERWISE JUST HIT CARRIAGE RETURN'////)
    PRINT 101
    READ 102,  ISTART
102 FORMAT(I1)
    CALL INIT
    IF(ISTART.NE.0)  GO TO 200
    CALL UNIVAR
200 CONTINUE
    CALL BESTPQ
    CALL STOC
    CALL UNIVAR
    CALL NATURE
    PRINT 901
901 FORMAT(///'MEDICAID PROFILE COMPLETE'///)
    STOP
    END
```

```
      SUBROUTINE INIT
C     INITIALIZES PROGRAM PARAMETERS
C
C
C
C
C
C
      COMMON/INTEG/ IER,IC,IARF,IPASF,IV,INV,ITYP,IQF,IWRITV,LFLAG,
     &              NFV,NLV,NTV,NUM,NUMAX,NUNMAX,NNV,NOUT,NOUT1,NOUT2,
     &               NV1,NVT1,NVT2,NUMF,NR,NV,NCS,NCSF,NVAR,MAR,NMPASS,
     &             MAXPRO,IVV(190),ID(190),NVV(190),IERV(400),
     &              IQ(2,100),IDUM(100)
C
      COMMON/REALV/ PINF,C1,C2,R,D,V173(12),V174(6),TOL1,TOL2,
     &              RANERR,QINF,XLEV(100)
C
      COMMON/OUTUNI/IVVR(4500),TC(47),TE(47),TNE(47),RS(47),AS(47),
     &         RP(47),AP(47),RE(47),AE(47),PTC(47),PTE(47),PTNE(47),
     &         PRS(47),PAS(47),PRP(47),PAP(47),PRE(47),PAE(47),
     &         ETE(47),ETNE(47),ERS(47),EAS(47),ERP(47),EAP(47),
     &         ERE(47),EAE(47),PRTE(47),PRTNE(47),PRRS(47),PRAS(47),
     &         PRRP(47),PRAP(47),PRRE(47),PRAE(47),
     &         Q(2,100)
C
      COMMON/PROFIL/IPR1(3),IPR2(12),IPRV1(3),IPRV2(12),IQP1(3),
     &              IQP2(12),IQPV1(3),IQPV2(12),IVP(17),IVVP(17),
     &              JV1,JV2,JQV1,JQV2,QPRO,PPRO,QQPRO,QPPRO,NUMPP,
     &              B(47),QP(17),PP(17),DP(15),DEP(15),DTEP(4)
-------------------------------------------------------------------------

      DATA IER,IC,IARF,IPASF/187,0,3,0/,NCS,NTV,NFV/758,189,4/,
     &IV,NLV,NUMAX,NUNMAX/0,189,100,5/,NUM,NNV/0,1/,MAR,LFLAG/162,0/,
     &     NOUT,NOUT1,NOUT2,NV1/1598,423,376,0/,NVT1,NVT2/47,96/,
     &     NCSP,NUMPP/0,0/,(IVV(I),I=1,190)/190*0/,
     & (IDUM(I),I=1,100)/100*0/,((IQ(I,J),J=1,100),I=1,2)/200*0/
     &     ,IWRITV/0/,NUMF/15/,IQF/0/,ITYP/123/,NR/15/,NV/11/,INV/8/,
     &     NVAR/162/,MAXPRO/5/,NMPASS/1000/,NFV/9/

      DATA (ID(I),I=1,190)/2*0,
     &     3*1,0,1,3,3*0,2*2,3*1,2,5*1,0,3*1,2,1,2*2,4*1,
     &     2*3,2,6*1,2*0,2,3,1,3,8*1,4*3,6*1,2,2*1,0,6*2,17*0,
     &     2*1,2*2,1,2,2*1,0,3*2,11*1,2,2*0,2*1,2*0,1,8*1,
     &     15*1,0,3*1,2*0,8*1,3,26*1,0/

      DATA (NVV(I),I=1,190)/1,
     &1,3,22,16,5,4,3,4,4,3,3,3,4,4,10,10,3,3,3,3,3,4,3,3,3,4,4,
     &4,4,3,4,4,4,3,5,4,3,3,3,3,3,3,3,3,3,3,3,3,3,5,6,6,5,6,6,
     &3,5,3,8,6,8,6,3,6,5,3,3,3,5,6,3,3,5,3,3,3,4,4,3,3,3,3,3,
     &3,3,4,3,3,3,3,4,8,7,6,3,3,3,3,3,3,3,3,5,5,5,6,5,5,5,3,4,
     &3,4,4,4,5,5,1,1,4,4,4,1,4,3,5,6,4,3,5,6,7,3,6,7,6,4,4,3,
     &5,3,7,5,7,22,22,6,7,4,1,6,1,1,3,7,3,7,8,3,5,13,5,4,15,15,
     &15,46,46,46,13,13,13,7,5,5,6,6,6,5,6,5,5,5,5,11,4,10,7,0/
```

```
C
      DATA C1,C2,D,R/155.,26.,681.,.25/,PINP/.15/,QINF/0./,
     &     RANERR/0./
C
      DATA (Q(1,J),J=1,100)/100*0./
C
      DATA (Q(2,J),J=1,100)/100*0./
C
      DATA (TC(I),I=1,47)/47*0./
C
      DATA (TE(I),I=1,47)/47*0./,(TNE(I),I=1,47)/47*0./
      DATA (RS(I),I=1,47)/47*0./,(AS(I),I=1,47)/47*0./
      DATA (RP(I),I=1,47)/47*0./
      DATA (AP(I),I=1,47)/47*0./
      DATA (RE(I),I=1,47)/47*0./
      DATA (AE(I),I=1,47)/47*0./
      DATA (PTC(I),I=1,47)/47*0./
      DATA (PTE(I),I=1,47)/47*0./
      DATA (PTNE(I),I=1,47)/47*0./
      DATA (PRS(I),I=1,47)/47*0./,
     &  (PAS(I),I=1,47)/47*0./,(PRP(I),I=1,47)/47*0./,
     &  (PAP(I),I=1,47)/47*0./,(PRE(I),I=1,47)/47*0./,
     &  (PAE(I),I=1,47)/47*0./,(ETE(I),I=1,47)/47*0./,
     &  (ETNE(I),I=1,47)/47*0./
      DATA (ERS(I),I=1,47)/47*0./,
     &  (EAS(I),I=1,47)/47*0./,(ERP(I),I=1,47)/47*0./,
     &  (EAP(I),I=1,47)/47*0./,(ERE(I),I=1,47)/47*0./,
     &  (EAE(I),I=1,47)/47*0./,(PRTE(I),I=1,47)/47*0./,
     &  (PRTNE(I),I=1,47)/47*0./,(PRRS(I),I=1,47)/47*0./,
     &  (PRAS(I),I=1,47)/47*0./,(PRRP(I),I=1,47)/47*0./,
     &  (PRAP(I),I=1,47)/47*0./,(PRRE(I),I=1,47)/47*0./,
     &  (PRAE(I),I=1,47)/47*0./

      DATA (QP(I),I=1,17)/17*0./,(PP(I),I=1,17)/17*0./
      DATA (IQP1(I),I=1,3)/3*0/
     & ,(IQP2(I),I=1,12)/12*0/,(IQPV1(I),I=1,3)/3*0/,
     &  (IQPV2(I),I=1,12)/12*0/,
     & (IVP(17),I=1,17)/17*0/,(IVVP(I),I=1,17)/17*0/,
     & (IPR1(I),I=1,3)/3*0/,(IPR2(I),I=1,12)/12*0/,
     & (IPRV1(I),I=1,3)/3*0/,(IPRV2(I),I=1,12)/12*0/

      DATA JV1,JV2/2*0/,QPRO,PPRO/2*0./
      DATA JQV1,JQV2/2*0/,QQPRO,QPPRO/2*0./

      DATA (DTEP(I),I=1,4)/4*0./
     &    ,(DEP(I),I=1,15)/15*0./,(DP(I),I=1,15)/15*0./
-----------------------------------------------------------------------------
```

```
C
  100 FORMAT(I1)
  200 FORMAT(F6.4)
C
      PRINT 101
  101 FORMAT(/1X,'TO INCLUDE BOTH APPLICATION & REDETERMINATION ',
     & 'ERRORS USE CARRIAGE'/' RETURN; OTHERWISE, ENTER 1 FOR APPLICAT',
     & 'ION ERRORS ONLY.'/' ENTER 2 FOR REDETERMINATION ERRORS ONLY.'/
     & ///)
      READ 100,  IARF
      IF(IARF.EQ.0) IARF=3
      PRINT 201
  201 FORMAT(/1X,'ENTER 1 FOR ADULT INDEPENDENT PROFILE.',
     & ' ENTER 2 FOR'/ ' NURSING HOME PROFILE.',
     & ' ENTER 3 FOR AFDC PROFILE.'////)
      READ 100,  IC
      PRINT 301
  301 FORMAT(/1X,'ENTER FORM OF PROFILE DESIRED. ENTER 1 FOR',
     & ' FIT(OR "F"),'/' ENTER 2 FOR YIELD (OR "Q") PROFILE.'////)
      READ 100,  IFY
      PRINT 401
  401 FORMAT(/' ENTER FIT OR YIELD VALUE DESIRED.  BEGIN WITH ',
     & 'DECIMAL POINT.'////)
      READ 200, FY
      IF(IFY.EQ.1) PINP=FY
      IF(IFY.EQ.2) QINP=FY
      IF(IFY.EQ.2) IQF=1
      RETURN
      END
```

```
      SUBROUTINE WRITPR(IW)
C     PRINTS PROFILE DISTRIBUTIONS
C
      COMMON/INTEG/ IER,IC,IARF,IPASF,IV,INV,ITYP,IQF,IWRITV,LFLAG,
     &              NFV,NLV,NTV,NUM,NUMAX,NUNMAX,NNV,NOUT,NOUT1,NOUT2,
     &              NV1,NVT1,NVT2,NUMP,NR,NV,NCS,NCSF,NVAR,MAR,NMPASS,
     &              MAXPRO,IVV(190),ID(190),NVV(190),IERV(400),
     &              IQ(2,100),IDUM(100)
C
      COMMON/REALV/ PINP,C1,C2,R,D,V173(12),V174(6),TOL1,TOL2,
     &              RANERR,QINF,XLEV(100)
C
      COMMON/OUTUNI/IVVR(4500),TC(47),TE(47),TNE(47),RS(47),AS(47),
     &         RP(47),AP(47),RE(47),AE(47),PTC(47),PTE(47),PTNE(47),
     &         PRS(47),PAS(47),PRP(47),PAP(47),PRE(47),PAE(47),
     &         ETE(47),ETNE(47),ERS(47),EAS(47),ERP(47),EAP(47),
     &         ERE(47),EAE(47),PRTE(47),PRTNE(47),PRRS(47),PRAS(47),
     &         PRRP(47),PRAP(47),PRRE(47),PRAE(47),
     &         Q(2,100)
C
      COMMON/PROFIL/IPR1(3),IPR2(12),IPRV1(3),IPRV2(12),IQP1(3),
     &              IQP2(12),IQPV1(3),IQPV2(12),IVP(17),IVVP(17),
     &              JV1,JV2,JQV1,JQV2,QPRO,PPRO,QQPRO,QPPRO,NUMPP,
     &              B(47),QP(17),PP(17),DP(15),DEP(15),DTEP(4)
C-----------------------------------------------------------------------
C
C
C
C
  100 CONTINUE
      WRITE(11,2050)
      IF(IQF.NE.0) GO TO 255
      IF(JV1.EQ.0) GO TO 230
      DO 220 I=1,JV1
      WRITE(11,2060) IPR1(I),IPRV1(I),DP(I),DEP(I)
  220 CONTINUE
  230 CONTINUE
      KK=JV1+1
      IF(JV2.EQ.0) GO TO 1000
      DO 240 I=1,JV2
      WRITE(11,2060) IPR2(I),IPRV2(I),DP(KK),DEP(KK)
      KK=KK+1
  240 CONTINUE
      GO TO 1000
  255 CONTINUE
      IF(JQV1.EQ.0) GO TO 270
      DO 260 I=1,JQV1
      WRITE(11,2060) IQP1(I),IQPV1(I),DP(I),DEP(I)
  260 CONTINUE
  270 CONTINUE
```

```
      KK=JQV1+1
      IF(JQV2.EQ.0) GO TO 1000
      DO 280 I=1,JQV2
      WRITE(11,2060) IQP2(I),IQPV2(I),DP(KK),DEP(KK)
      KK=KK+1
  280 CONTINUE
      GO TO 1000
C
C
C     -----------------------------------------------------------------------
C
C
 2050 FORMAT(/6X,'DISTRIBUTION OF PROFILE CHARACTERISTICS FOR ',
     & 'PROFILE POPULATION'/6X,62('-')///1X,'CHARACTERISTIC',2X,
     &'PERCENTAGE OF ALL PROFILE CASES',3X,'PERCENTAGE OF PROFILE ',
     & 'ERROR'/
     & 1X,'VAR #',5X,'VALUE',4X,'CASES HAVING CHARACTERISTIC',
     & 4X,'CASES HAVING CHARACTERISTIC'//)
 2060 FORMAT(2X,I3,7X,I3,14X,F6.4,27X,F6.4/)
 1000 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE UNIVAR
C     UNIVARIENT ANALYSIS
C
      COMMON/INTEG/ IER,IC,IARF,IPASF,IV,INV,ITYP,IQF,IWRITV,LFLAG,
     &              NPV,NLV,NTV,NUM,NUMAX,NUNMAX,NNV,NOUT,NOUT1,NOUT2,
     &              NV1,NVT1,NVT2,NUMP,NR,NV,NCS,NCSP,NVAR,MAR,NMPASS,
     &              MAXPRO,IVV(190),ID(190),NVV(190),IERV(400),
     &              IQ(2,100),IDUM(100)
C
      COMMON/REALV/ PINP,C1,C2,R,D,V173(12),V174(6),TOL1,TOL2,
     &              RANERR,QINP,XLEV(100)
C
      COMMON/OUTUNI/IVVR(4500),TC(47),TE(47),TNE(47),RS(47),AS(47),
     &         RP(47),AP(47),RE(47),AE(47),PTC(47),PTE(47),PTNE(47),
     &         PRS(47),PAS(47),PRP(47),PAP(47),PRE(47),PAE(47),
     &         ETE(47),ETNE(47),ERS(47),EAS(47),ERP(47),EAP(47),
     &         ERE(47),EAE(47),PRTE(47),PRTNE(47),PRRS(47),PRAS(47),
     &         PRRP(47),PRAP(47),PRRE(47),PRAE(47),
     &         Q(2,100)
C
      COMMON/PROFIL/IPR1(3),IPR2(12),IPRV1(3),IPRV2(12),IQP1(3),
     &              IQP2(12),IQPV1(3),IQPV2(12),IVP(17),IVVP(17),
     &              JV1,JV2,JQV1,JQV2,QPRO,PPRO,QQPRO,QPPRO,NUMPP,
     &              B(47),QP(17),PP(17),DP(15),DEP(15),DTEP(4)
C-----------------------------------------------------------------------
C
C
      DIMENSION OUT1(1),OUT2(1),OUT3(1),OUT4(1),OUT12(1),
     &         OUT22(1),ARS(1),ARE(1),ARP(1),IVT(1)
C
      EQUIVALENCE (OUT1,TC),(OUT2,PTC),(OUT3,ETE),
     &              (OUT4,PRTE),(OUT12,TE),(OUT22,PTE),
     &              (ARS,RS),(ARP,RP),(ARE,RE),
     &              (IDUM,IVT)

      DATA ICAUS/171/,IPAY/186/,ITYPER/168/,IDOLL/174/,IAR/136/


      ICN=1
      DO 5 I=1,100
      XLEV(I)=0.
    5 CONTINUE
      IF(IPASF.EQ.0) GO TO 10
      IR=4
      NCS=NCSP
      GO TO 30
   10 CONTINUE
```

```
C     READ INPUT DATA CASES
      IR=2
      DO 20 I=1,NCS
      READ(3,2)  (IVV(J),J=1,66)
      READ(3,4)  (IVV(J),J=67,145)
      READ(3,6)  (IVV(J),J=146,189)
C
      IF(IVV(ITYP).NE.IC) GO TO 20
      IF(IARF.EQ.3)  GO TO 21
      IF(IVV(IAR).EQ.0.AND.IARF.EQ.2) GO TO 20
      IF(IVV(IAR).NE.0.AND.IARF.EQ.1) GO TO 20
   21 CONTINUE
      IERV(ICN)=IVV(IER)
      IF(IVV(MAR).GT.10) IERV(ICN)=IERV(ICN)+50
      DO 11 KK=1,3
      JJ=ICAUS+KK-1
      II=ITYPER+KK-1
      IVV(JJ)=IVV(JJ)+100*IVV(II)
   11 CONTINUE
      IVV(IDOLL)=IVV(IDOLL)+IVV(IPAY)*10
      ICN=ICN+1
      WRITE(2,22) (IVV(J),J=4,66)
      WRITE(2,24) (IVV(J),J=67,145)
      WRITE(2,26) (IVV(J),J=146,161),(IVV(J),J=171,174)
   20 CONTINUE
      ICN=ICN-1
      NCS=ICN
      DO 16 K=1,NCS
      IVVR(K)=IERV(K)
      IF(IVVR(K).GT.49) IVVR(K)=IVVR(K)-50
   16 CONTINUE
C     BEGIN ANALYSIS OF CASES FOR INPUT CATEGORY (IC)
      DO 17 K=1,NCS,50
      K1=K+49
      WRITE(2,23) (IVVR(L),L=K,K1)
   17 CONTINUE

   30 CONTINUE
      FNCS=FLOAT(NCS)
      IF(IPASF.EQ.0) PRINT 9191, NCS
 9191 FORMAT(//' PROGRAM SEGMENT ',I5  /////)
      TTE=0.
      IV=0
      NR1=0
```

```
C           READ  VARIABLES FROM DISK
C
      DO 90 LV=1,NR
      IF(IPASF.EQ.0) REWIND 2
      IF(IPASF.GT.0) REWIND 4
      NR1=NR1+1
      L1=1
      DO 60 K=1,NCS
      IF(IPASF.EQ.1) GO TO 38
      READ(2,22) (IVV(I),I=1,63)
      READ(2,24) (IVV(I),I=64,142)
      READ(2,26) (IVV(I),I=143,158),(IVV(I),I=168,171)
      GO TO 39
   38 CONTINUE
      READ(4,22) (IVV(I),I=1,63)
      READ(4,24) (IVV(I),I=64,142)
      READ(4,26) (IVV(I),I=143,158),(IVV(I),I=168,171)
   39 CONTINUE
      LN=(NR1-1)*NV+1
      LN1=LN+NV-1
      IF(LV.EQ.NR) LN1=INV-1+LN
      DO 40 L=LN,LN1
      IVVR(L1)=IVV(L)
      L1=L1+1
   40 CONTINUE
   60 CONTINUE
      IF(IPASF.EQ.0.OR.LV.NE.1) GO TO 66
      DO 65 K=1,NCS,50
      K1=K+49
      READ(4,23) (IERV(L),L=K,K1)
   65 CONTINUE
   66 CONTINUE

      BEGIN LOOP ON VARIABLES


      IF(LV.EQ.NR) NV=INV
      DO 90 KV=1,NV
      IV = IV+1
           IV3 IS NECESSARY
      IV3=IV+3

      IF(ID(IV3).EQ.3.AND.IC.NE.1) GO TO 90
      IF(IV.EQ.144.OR.IV.EQ.138.OR.IV.EQ.143) GO TO 90
      IF(IV.EQ.137) GO TO 90
      IF(IV.LT.154) GO TO 104
      IF(IPASF.EQ.0) GO TO 90
      IF(IV.LT.159) GO TO 90
  104 CONTINUE
      NNV=NVV(IV3)
      NV1=NNV+1
      ZERO OUTPUT ARRAYS
      DO 105 I=1,NOUT
      OUT1(I)=0.
  105 CONTINUE
```

```
C     BEGIN LOOP ON CASES
C
      DO 55 ICN=1,NCS
      IV1=KV+(ICN-1)*NV
      IF(LV.EQ.NR) IV1=KV+(ICN-1)*INV
      IVV(IV)=IVVR(IV1)
      IERR=IERV(ICN)
      IF(IERR.GT.49) IERR=IERV(ICN)-50
      IF(IPASF.EQ.0) GO TO 70
      IF(IQF.NE.0) GO TO 1110
      IF(JV1.EQ.0) GO TO 125
      DO 120 J=1,JV1
      IF(IPR1(J).NE.IV3) GO TO 120
      IF(IVV(IV).NE.IPRV1(J)) GO TO 120
      DP(J)=DP(J)+1.
      IF(IERR.NE.0) DEP(J)=DEP(J)+1.
      GO TO 130
  120 CONTINUE
  125 CONTINUE
      IF(JV2.EQ.0) GO TO 1120
      KK=JV1
      DO 127 J=1,JV2
      KK=KK+1
      IF(IPR2(J).NE.IV3) GO TO 127
      IF(IVV(IV).NE.IPRV2(J)) GO TO 127
      DP(KK)=DP(KK)+1.
      IF(IERR.NE.0) DEP(KK)=DEP(KK)+1.
      GO TO 130
  127 CONTINUE
 1110 CONTINUE
      IF(JQV1.EQ.0) GO TO 1125
      DO 1200 J=1,JQV1
      IF(IQP1(J).NE.IV3) GO TO 1200
      IF(IVV(IV).NE.IQPV1(J)) GO TO 1200
      DP(J)=DP(J)+1.
      IF(IERR.NE.0) DEP(J)=DEP(J)+1.
      GO TO 130
 1200 CONTINUE
 1125 CONTINUE
      IF(JQV2.EQ.0) GO TO 1120
      KK=JQV1
      DO 1127 J=1,JQV2
      KK=KK+1
      IF(IQP2(J).NE.IV3) GO TO 1127
      IF(IVV(IV).NE.IQPV2(J)) GO TO 1127
      DP(KK)=DP(KK)+1.
      IF(IERR.NE.0) DEP(KK)=DEP(KK)+1.
      GO TO 130
 1127 CONTINUE
 1120 CONTINUE
      IF(LV.NE.NR) GO TO 70
      GO TO 150
  130 CONTINUE
      IF(ICN.EQ.NCS) GO TO 90
      GO TO 55
```

```
C      CALCULATE ADDITIONAL PERCENTAGES
C
  150 CONTINUE
      DO 200 I=1,NUMP
      IF(DP(I).EQ.0.) GO TO 200
      DEP(I)=DEP(I)/DP(I)
      DP(I)=DP(I)/FNCS
  200 CONTINUE
      GO TO 590
C
C
C
   70 CONTINUE
C     BEGIN INNER LOOP
C     ******************************
C
      DO 50 I=1,NNV
      IF(IVV(IV).NE.I-1) GO TO 50
      TC(I)=TC(I)+1.
      IF(IPASF.EQ.0) GO TO 300
C
      IF(IERR.NE.0) TNE(I)=TNE(I)+1.
      IF(IERR.EQ.0) TE(I)=TE(I)+1.
      GO TO 50
C
  300 IF(IERR.GE.1) GO TO 310
      TNE(I)=TNE(I)+1.
      GO TO 50
  310 J=I
      TE(I)=TE(I)+1.
      IF(IERR.GE.2) AS(I)=AS(I)+1.
      IF(IERR.NE.2) RS(I)=RS(I)+1.
      IF(IERV(ICN).LT.50) GO TO 340
      IF(IERR.GE.2) AE(I)=AE(I)+1.
      IF(IERR.NE.2) RE(I)=RE(I)+1.
      GO TO 50
  340 CONTINUE
      IF(IERR.GE.2) AP(I)=AP(I)+1.
      IF(IERR.NE.2) RP(I)=RP(I)+1.
   50 CONTINUE
      END OF INNER LOOP
      ******************************
   55 CONTINUE
      END OF LOOP ON NUMBER OF CASES
```

```
C     CALCULATE PROGRAM PARAMETERS TO PRINT
      M=0
      DO 420 J=NV1,NOUT1,NVT1
      DO 410 I=1,NNV
      K=M+I
  410 OUT1(J)=OUT1(J)+OUT1(K)
      M=M+NVT1
  420 CONTINUE
      N=NV1
      DO 440 J=1,NOUT1,NVT1
      DO 430 I=1,NNV
      K=J+I-1
  430 IF(OUT1(N).NE.0.) OUT2(K)=OUT1(K)/OUT1(N)
  440 N=N+NVT1
      DO 460 J=1,NOUT2,NVT1
      DO 460 I=1,NV1
      K=J+I-1
      IF(TC(I).EQ.0.) GO TO 450
      OUT4(K)=OUT12(K)/TC(I)
  450 CONTINUE
      IF(I.EQ.NV1) GO TO 460
      IF(PTC(I).EQ.0.) GO TO 460
      OUT3(K)=OUT22(K)/PTC(I)
  460 CONTINUE
      IF(IV3.EQ.48.OR.IV3.EQ.115) GO TO 530
      IF(IV3.EQ.126.OR.IV3.EQ.127) GO TO 530
C
C     TEST OF STATISTICAL SIGNIFICANCE
      DO 520 I=1,NNV
      TESTE=TE(NV1)-TE(I)
      TESTN=TC(NV1)-TC(I)
      IF(TESTN.EQ.0) GO TO 520
      PHAT1=PRTE(I)
      PHAT2=TESTE/TESTN
      PHAT=PRTE(NV1)
      IF(TC(I).EQ.0.) GO TO 520
      SIGMA2=PHAT*(1.-PHAT)*(1./TC(I)+1./TESTN)
      SIGMA=SQRT(SIGMA2)
      IF(SIGMA.EQ.0.) GO TO 520
      X=((PHAT1-PHAT2)/SIGMA)-2.
      IF(X.LT.0.) GO TO 520
      NUM=NUM+1
      XLEV(NUM)=X
      IF(NUM.GT.NUMAX) GO TO 530
      Q(1,NUM)=PRTE(I)
      Q(2,NUM)=PTC(I)
      IQ(1,NUM)=IV3
      IQ(2,NUM)=I-1
  520 CONTINUE
```

```
  530 CONTINUE
C       CALCULATE COST OF ERROR
        DO 540 I=1,NNV
        B(I)=PRTE(I)*D-C1
  540 CONTINUE
        IF(IPASF.GT.0) GO TO 90
   90 CONTINUE
C       END LOOP ON VARIABLES
C
C
  590 CONTINUE
  595 CONTINUE
C
C       ERROR INCIDENCE MAPPING REQUIRED
C       FOR IPASF=2 MAPPING MUST BE ALTERED
        N=NUM
        IF(NUM.LT.NUNMAX) NUNMAX=NUM
        IF(IPASF.EQ.2) N=NUNMAX
        DO 600 I=1,N
        DO 600 J=1,I
        IF(IPASF.NE.2) GO TO 596
        PQI=Q(1,I)*Q(2,I)
        PQJ=Q(1,J)*Q(2,J)
        IF(PQI.LT.PQJ) GO TO 600
        GO TO 597
  596 CONTINUE
        IF(XLEV(I).LT.XLEV(J)) GO TO 600
  597 SET1=Q(1,J)
        Q(1,J)=Q(1,I)
        Q(1,I)=SET1
        SET2=Q(2,J)
        Q(2,J)=Q(2,I)
        Q(2,I)=SET2
        SET3=XLEV(J)
        XLEV(J)=XLEV(I)
        XLEV(I)=SET3
        ISET1=IQ(1,J)
        IQ(1,J)=IQ(1,I)
        IQ(1,I)=ISET1
        ISET2=IQ(2,J)
        IQ(2,J)=IQ(2,I)
        IQ(2,I)=ISET2
  600 CONTINUE
        IF(IPASF.EQ.2) GO TO 640
        WRITE(8,9603)  NCS,NUM
        DO 625 I=1,NUM
        WRITE(8,9602) Q(1,I),Q(2,I),IQ(1,I),IQ(2,I),XLEV(I)
  625 CONTINUE
        IF(IPASF.EQ.0) GO TO 700
        IPASF=2
```

```
      GO TO 590
  640 CONTINUE
      TOLER=.1
      TOLLER=.75
      DO 645 I=1,NUNMAX
      IF(Q(2,I).GT.TOLER) GO TO 645
      IF(Q(1,I).LT.TOLLER) GO TO 645
      IVP(16)=IQ(1,I)
      IVVP(16)=IQ(2,I)
      GO TO 646
  645 CONTINUE
      IVP(16)=0
      GO TO 700
  646 CONTINUE
      REWIND 4
      TTC=0.
      TTE=0.
      DO 650 I=1,NCSP
      READ(4,22)(IVV(J),J=1,63)
      READ(4,24) (IVV(J),J=64,142)
      READ(4,26) (IVV(J),J=143,158),(IVV(J),J=168,171)
      IERR=IERV(I)
      IF(IERV(I).GT.49) IERR=IERR-50
      J=IVP(16)-3
      IF(IVV(J).NE.IVVP(16)) TTC=TTC+1.
      IF(IVV(J).NE.IVVP(16).AND.IERR.NE.0) TTE=TTE+1.
  650 CONTINUE
      P=TTC/FNCS
      QPRO=TTE/TTC
      IF(IQF.NE.0) QQPRO=QPRO
      IF(IQF.NE.0) QPPRO=QPPRO*P
      PPRO=PPRO*P
  700 CONTINUE
C
C-----------------------------------------------------------------------
C
    2 FORMAT(I9,I3,I1,2I2,10I1,2I2,49I1)
    4 FORMAT(79I1)
    6 FORMAT(2I2,14I1,I2,2I1,9I2,12I1,I2,I1,I2,I1)
   23 FORMAT(50I1)
   22 FORMAT(2I2,10I1,2I2,49I1)
   24 FORMAT(79I1)
   26 FORMAT(2I2,14I1,4I4)
  602 FORMAT(5X,'Q= ',F6.4,5X,'P= ',F6.4,5X,'V= ',I4,5X,
     &  'VAL= ',I4,5X,'XLEV= ',F6.4)
 9602 FORMAT(2F6.4,2I4,F6.4)
 9603 FORMAT(2I4)
      RETURN
      END
```

```
      SUBROUTINE BESTPQ
C     SELECTS THE BEST SIGNIFICANT VARIABLES BY ANALYZING P & Q
C
      COMMON/INTEG/ IER,IC,IARF,IPASF,IV,INV,ITYP,IQF,IWRITV,LFLAG,
     &              NPV,NLV,NTV,NUM,NUMAX,NUNMAX,NNV,NOUT,NOUT1,NOUT2,
     &              NV1,NVT1,NVT2,NUMP,NR,NV,NCS,NCSP,NVAR,MAR,NMPASS,
     &              MAXPRO,IVV(190),ID(190),NVV(190),IERV(400),
     &              IQ(2,100),IDUM(15),I,J,K,L,M,I1,M1,N1,IM,JJ,KJ,LK,
     &              IDUM1(72)
C
      COMMON/REALV/ PINP,C1,C2,R,D,V173(12),V174(6),TOL1,TOL2,
     &              RANERR,QINP,XLEV(100)
C
      COMMON/OUTUNI/IVVR(4500),TC(47),TE(47),TNE(47),RS(47),AS(47),
     &         RP(47),AP(47),RE(47),AE(47),PTC(47),PTE(47),PTNE(47),
     &         PRS(47),PAS(47),PRP(47),PAP(47),PRE(47),PAE(47),
     &         ETE(47),ETNE(47),ERS(47),EAS(47),ERP(47),EAP(47),
     &         ERE(47),EAE(47),PRTE(47),PRTNE(47),PRRS(47),PRAS(47),
     &         PRRP(47),PRAP(47),PRRE(47),PRAE(47),
     &         Q(2,100)
C
      COMMON/PROFIL/IPR1(3),IPR2(12),IPRV1(3),IPRV2(12),IQP1(3),
     &              IQP2(12),IQPV1(3),IQPV2(12),IVP(17),IVVP(17),
     &              JV1,JV2,JQV1,JQV2,QPRO,PPRO,QQPRO,QPPRO,NUMPP,
     &              B(47),QP(17),PP(17),DP(15),DEP(15),DTEP(4)
C-----------------------------------------------------------------------
C
      EQUIVALENCE (IPVV,IVVR)
      DIMENSION IPVV(1),JNUM(3),KNUM(12),MAX(2)
      DATA JNUM/3*0/,KNUM/12*0/
C-----------------------------------------------------------------------
C
      REWIND 8
      READ(8,9603)  NCS,NUM
      DO 5 I=1,NUM
      READ(8,9602)  Q(1,I),Q(2,I),IQ(1,I),IQ(2,I), XLEV(I)
    5 CONTINUE
      KM1=1
      K=1
      IRH=0
      ILH=0
      PT=0.
      LFLAG=3
      NUMP=MIN0(15,NUM)
      PTOL1=.2
      PTOL2=2.*PINP
      IF(PINP.GT.PTOL1) PTOL1=PINP
      L=1
      MAX(1)=3
      MAX(2)=NUMP-3
```

```
100 CONTINUE
    DO 200 I=1,NUM
    IF(L.EQ.2) GO TO 30
 20 CONTINUE
    IF(PT.LT.PTOL2) GO TO 25
    IF(Q(2,I).LT.PTOL1.AND.I.EQ.NUM) GO TO 300
 25 CONTINUE
    IF(Q(2,I).LT.PTOL1) GO TO 200
    GO TO 50
 30 CONTINUE
    DO 40 M=1,3
    IF(I.EQ.JNUM(M)) GO TO 200
 40 CONTINUE
 50 CONTINUE
    PP(K)=Q(2,I)
    PT=PT+PP(K)
    IF(L.EQ.1) JNUM(K)=I
    IF(L.EQ.2) KNUM(K)=I
    K=K+1
    KM1=K-1
    DO 60 II=1,KM1
    DO 60 J=1,II
    IF(PP(II).LT.PP(J)) GO TO 60
    SET=PP(J)
    PP(J)=PP(II)
    PP(II)=SET
    IF(L.EQ.2) GO TO 55
C
    ISET=JNUM(J)
    JNUM(J)=JNUM(II)
    JNUM(II)=ISET
    GO TO 60
 55 CONTINUE
    ISET=KNUM(J)
    KNUM(J)=KNUM(II)
    KNUM(II)=ISET
 60 CONTINUE
    IF(PT.GT.PTOL2.AND.K.GT.MAX(L)) GO TO 300
    IF(PT.GT.PTOL2.AND.I.EQ.NUM) GO TO 300
    IF(K.LE.MAX(L)) GO TO 200
    N1=K
    K=K-1
    PT=PT-PP(MAX(L))




    IF(L.EQ.1) GO TO 200
```

```
      IF(L.EQ.1) GO TO 200
      IRH=K
      DO 80 N=N1,NUM
      IF(Q(2,N).LT.PP(IRH)) GO TO 80
      IF(ILH.EQ.0) GO TO 75
      DO 70 KK=1,ILH
      IF(N.EQ.JNUM(KK)) GO TO 80
   70 CONTINUE
   75 CONTINUE
      PP(IRH)=Q(2,N)
      KNUM(IRH)=N
   80 CONTINUE
      PT1=PT+PP(IRH)
      IF(PT1.LT.PTOL2) GO TO 900
      K=K+1
      GO TO 350
  200 CONTINUE
      LFLAG=0
      NUMP=NUMP-3
      JNUM(1)=0
      JNUM(2)=0
      JNUM(3)=0
      GO TO 325
C
C
C
  300 CONTINUE
      IF(L.EQ.2) GO TO 350
      ILH=K-1
      LFLAG=ILH
      NUMP=NUMP-3+ILH
      DO 320 J=1,ILH
      N=JNUM(J)
      M=NUMP-J+1
      IVVP(M)=IQ(2,N)
      IVP(M)=IQ(1,N)
      QP(M)=Q(1,N)
      PP(M)=PP(J)
  320 CONTINUE
  325 CONTINUE
      L=2
      K=1
      PT=0.
      DO 330 I=1,3
      PP(I)=0.
  330 CONTINUE
      GO TO 100
```

```
  350 CONTINUE
      IRH=K-1
      DO 380 J=1,IRH
      N=KNUM(J)
      IVP(J)=IQ(1,N)
      IVVP(J)=IQ(2,N)
      QP(J)=Q(1,N)
  380 CONTINUE
C
C     THE STOCHASTIC SEARCH EXPECTS THIS INCIDENCE MAPPING
      DO 400 I=1,NUMP
      DO 400 J=1,I
      IF(PP(I).GT.PP(J)) GO TO 400
      SET1=PP(I)
      PP(I)=PP(J)
      PP(J)=SET1
      SET1=QP(I)
      QP(I)=QP(J)
      QP(J)=SET1
      ISET=IVP(I)
      IVP(I)=IVP(J)
      IVP(J)=ISET
      ISET=IVVP(I)
      IVVP(I)=IVVP(J)
      IVVP(J)=ISET
  400 CONTINUE
C
C     PRINT OUTPUT PARAMETERS
C
C     ALL SIG. VAR. OF THIS SET ARE APPLICABLE
      REWIND 2
      KJ=0
      DO 910 K=1,NCS
      READ(2,22) (IVV(I),I=1,63)
      READ(2,24) (IVV(I),I=64,142)
      READ(2,26) (IVV(I),I=143,158),(IVV(I),I=168,171)
      DO 910 J=1,NUMP
      KJ=KJ+1
      JJ=IVP(J)-3
      IPVV(KJ)=IVV(JJ)
  910 CONTINUE
```

```
      DO 920 K=1,NCS,50
      K2=K+49
      READ(2,23) (IERV(K1),K1=K,K2)
  920 CONTINUE
      DO 940 K=1,NCS
      IF(IERV(K).NE.0) RANERR=RANERR+1.
  940 CONTINUE
      FNCS=FLOAT(NCS)
      RANERR=RANERR/FNCS
      GO TO 1000
C
C
C
  900 CONTINUE
      PDIF1=10.
      DO 991 I=NUM
      IF(XLEV(I).LT.2.) GO TO 991
      PDIF=ABS(PINP-Q(2,I))
      IF(PDIF.GT.PDIF1) GO TO 991
      PDIF1=PDIF
      J=I
  991 CONTINUE
      PRINT 999, IQ(1,J),IQ(2,J),Q(2,J),Q(1,J)
      WRITE(11,999) IQ(1,J),IQ(2,J),Q(2,J),Q(1,J)
      STOP
C
C     ERROR IN DATA OR INPUT P
C
C
  999 FORMAT(//1X,'NO FIT PROFILE POSSIBLE WITHIN PRESCRIBED TOLER',
     & 'ANCE'/1X,'TRY USING MINIMUM YIELD PROFILE AND A SMALLER ',
     & 'TARGET FIT'/1X,'THE VARIABLE WITH P CLOSEST TO THE TARGET ',
     & 'FIT IS '//10X,'VARIABLE # ',I4,'    VALUE ',I3/10X'P = ',F6.4,
     & 9X,'Q = ',F6.4/)
   22 FORMAT(2I2,10I1,2I2,49I1)
   24 FORMAT(79I1)
   26 FORMAT(2I2,14I1,4I4)
   23 FORMAT(50I1)
 9602 FORMAT(2F6.4,2I4,F6.4)
 9603 FORMAT(2I4)


 1000 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE STOC
C     STOCHASTIC SIMULATION
C
      COMMON/INTEG/ IER,IC,IARF,IPASF,IV,INV,ITYP,IQF,IWRITV,LFLAG,
     &              NPV,NLV,NTV,NUM,NUMAX,NUNMAX,NNV,NOUT,NOUT1,NOUT2,
     &              NV1,NVT1,NVT2,NUMP,NR,NV,NCS,NCSP,NVAR,MAR,NMPASS,
     &              MAXPRO,IVV(190),ID(190),NVV(190),IERV(400),
     &              IQ(2,100),IDUM(100)
C
      COMMON/REALV/ PINP,C1,C2,R,D,V173(12),V174(6),TOL1,TOL2 ,
     &              RANERR,QINP,XLEV(100)
C
      COMMON/OUTUNI/IVVR(4500),TC(47),TE(47),TNE(47),RS(47),AS(47),
     &         RP(47),AP(47),RE(47),AE(47),PTC(47),PTE(47),PTNE(47),
     &         PRS(47),PAS(47),PRP(47),PAP(47),PRE(47),PAE(47),
     &         ETE(47),ETNE(47),ERS(47),EAS(47),ERP(47),EAP(47),
     &         ERE(47),EAE(47),PRTE(47),PRTNE(47),PRRS(47),PRAS(47),
     &         PRRP(47),PRAP(47),PRRE(47),PRAE(47),
     &         Q(2,100)
C
      COMMON/PROFIL/IPR1(3),IPR2(12),IPRV1(3),IPRV2(12),IQP1(3),
     &              IQP2(12),IQPV1(3),IQPV2(12),IVP(17),IVVP(17),
     &              JV1,JV2,JQV1,JQV2,QPRO,PPRO,QQPRO,QPPRO,NUMPP,
     &              B(47),QP(17),PP(17),DP(15),DEP(15),DTEP(4)
C------------------------------------------------------------------------
C
      DIMENSION PDIF1(15),IPL(3,5),IPR(12,5),ILHVN(1),IRHVN(1),IPVV(1)
      EQUIVALENCE (IDUM,IPR)
      EQUIVALENCE (IPL,IDUM(61))
      EQUIVALENCE (IRHVN,IDUM(76))
      EQUIVALENCE (IDUM(99),NTOL1)
      EQUIVALENCE (IDUM(98),NTOL)
      EQUIVALENCE (ILHVN,IDUM(91))
      EQUIVALENCE  (IPVV,IVVR)
```

```
      L=0
      NTOL=16
      NTOL1=2*MAXPRO
      DO 3 I=1,180
      IVV(I)=0
    3 CONTINUE
       Y=.37843
      X=.37843
      TOL1=PINP*1.15
      TOL2=1.05*PINP
      IFILL=1
      FNCS=FLOAT(NCS)
      QPPRO=0.
      M=0
      DO 5 I=1,NUMP
      PDIF1(I)=0.
      QP(I)=0.
      PP(I)=0.
    5 CONTINUE
      IRH=NUMP
      ILH=1
      IF(LFLAG.NE.0) ILH=LFLAG
      IF(LFLAG.NE.0) IRH=IRH-ILH
      RN2=PINP+.2
      RN1=1./FLOAT(ILH)
C
C     BEGIN LOOP ON RANDOM PROFILE TRIALS
      DO 500 ICOUNT=1,NMPASS
      ITAG=0
      IPCONT=0
      DO 10 JL=1,ILH
      ILHVN(JL)=0
      Z=37.*X
      X=AMOD(Z,1.)
      IF(LFLAG.EQ.0) GO TO 15
      IF(X.LT.RN1) ILHVN(JL)=NUMP-JL+1
      IF(X.LT.RN1) ITAG=1
      IF(X.LT.RN1) IPCONT=IPCONT+1
   10 CONTINUE
   15 CONTINUE
```

```
      DO 20 JR=1,IRH
      IRHVN(JR)=0
      IF(IPCONT.EQ.NPV) GO TO 20
      Z=37.*Y
      Y=AMOD(Z,1.)
      IF(Y.LT.RN2) IRHVN(JR)=JR
      IF(Y.LT.RN2) ITAG=1
      IF(Y.LT.RN2) IPCONT=IPCONT+1
   20 CONTINUE
      IF(ITAG.EQ.0) GO TO 500
      TTE=0.
      TTC=0.
C
C     BEGIN INNER LOOP
C
      DO 100 N=1,NCS
      DO 40 JL=1,ILH
      IF(ILHVN(JL).NE.0) GO TO 45
   40 CONTINUE
C     NULL MAPPING NOT SIGNIFICANT
      GO TO 60
   45 CONTINUE
      DO 50 JL=1,ILH
      K=ILHVN(JL)
      IF(K.EQ.0) GO TO 50
      K1=K+(N-1)*NUMP
      IF(IPVV(K1).EQ.IVVP(K)) GO TO 60
   50 CONTINUE
      GO TO 100
   60 CONTINUE
C      LARGEST INCIDENCE MAPPING IS SATISFIED
      DO 70 JR=1,IRH
      K=IRHVN(JR)
      IF(K.EQ.0) GO TO 70
      K1=K+(N-1)*NUMP
      IF(IPVV(K1).EQ.IVVP(K)) GO TO 80
   70 CONTINUE
      GO TO 100
   80 CONTINUE
      (MAPPING IS COMPLETE)
      TTC=TTC+1.
      IF(IERV(N).NE.0) TTE=TTE+1.
  100 CONTINUE

      END OF INNER LOOP
```

```
      P=0.
      QQ=0.
      P=TTC/FNCS
      IF(TTC.NE.0.) QQ=TTE/TTC
      PDIF=P-PINP
      NTOL2=NTOL*(NTOL1+1)+NTOL1+NVV(3)-1
       IF(NVV(NTOL2).NE.NTOL1) GO TO 982
      IF(QINP.EQ.0.) GO TO 160
C
C     MINIMUM ERROR RATE
      IF(QQ.EQ.0.) GO TO 500
      QTOL=QINP*.95
      IF(QQ.LT.QTOL) GO TO 160
      IF(P.EQ.0.) GO TO 500
      IF(P.LT.QPPRO) GO TO 160
      DO 105 J=1,ILH
      IQP1(J)=0
      IQPV1(J)=0
  105 CONTINUE
      DO 106 J=1,IRH
      IQP2(J)=0
      IQPV2(J)=0
  106 CONTINUE
      JJ=1
      K=1
      DO 110 J=1,IRH
      IF(IRHVN(J).EQ.0) GO TO 110
      IQP2(JJ)=IVP(IRHVN(J))
      IQPV2(JJ)=IVVP(IRHVN(J))
      JJ=JJ+1
  110 CONTINUE
      DO 111 J=1,ILH
      IF(ILHVN(J).EQ.0) GO TO 111
      IQP1(K)=IVP(ILHVN(J))
      IQPV1(K)=IVVP(ILHVN(J))
      K=K+1
  111 CONTINUE
      QPPRO=P
      QQPRO=QQ
      JQV1=K-1
      JQV2=JJ-1

      INCIDENCE IS DOMINANT FOR ALL RUNS EXCEPT IQF NON ZERO
  160 CONTINUE
      IF(PDIF.GT.TOL1) GO TO 500
      IF(P.LT.TOL2) GO TO 500
      IF(PDIF.LT.0.) GO TO 500
      IF(IFILL.LE.MAXPRO) GO TO 260
```

```
      DO 190 K=1,MAXPRO
      DO 180 J=1,IRH
      IF(J.GT.ILH) GO TO 170
      IF(IPL(J,K).NE.ILHVN(J)) GO TO 190
  170 CONTINUE
      IF(IPR(J,K).NE.IRHVN(J)) GO TO 190
  180 CONTINUE
C     THIS TRIAL PROFILE IS A DUPLICATE
      GO TO 500
  190 CONTINUE
C
      DO 200 J=1,MAXPRO
      IF(QP(J).GE.QQ) GO TO 200
      GO TO 205
  200 CONTINUE
      GO TO 500
  205 CONTINUE
      PDIF1(MAXPRO)=PDIF
      QP(MAXPRO)=QQ
      PP(MAXPRO)=P
      DO 210 J=1,IRH
      IPR(J,MAXPRO)=IRHVN(J)
      IF(J.LE.ILH) IPL(J,MAXPRO)=ILHVN(J)
  210 CONTINUE
  220 CONTINUE
C     MAPPING REQUIRMENT RELATIVE TO ABSOLUTE DIFFERENCE OF P,PINP
      DO 250 I=1,MAXPRO
      DO 250 J=1,I
      IF(QP(I).LT.QP(J)) GO TO 250
      DO 240 K=1,IRH
      IF(K.GT.ILH) GO TO 230
      ISET1=IPL(K,I)
      IPL(K,I)=IPL(K,J)
      IPL(K,J)=ISET1
  230 CONTINUE
      ISET2=IPR(K,I)
      IPR(K;I)=IPR(K,J)
      IPR(K,J)=ISET2
  240 CONTINUE
      SET1=QP(I)
      SET2=PP(I)
      PP(I)=PP(J)
      QP(I)=QP(J)
      QP(J)=SET1
      PP(J)=SET2
  250 CONTINUE
      GO TO 500
  260 CONTINUE
```

```
C     COMPLETE INITIAL{MAXPRO} PROFILE SET
      QP(IFILL)=QQ
      PP(IFILL)=P
      PDIF1(IFILL)=PDIF
      DO 270      J=1,IRH
      IF(J.LE.ILH) IPL(J,IFILL)=ILHVN(J)
      IPR(J,IFILL)=IRHVN(J)
  270 CONTINUE
      IFILL=IFILL+1
      IF(IFILL.GT.MAXPRO) GO TO 220
  500 CONTINUE
C
C     HEED PXQ
      PTEST=0.
      K=15
      DO 305 I=1,NCS
      IF(IPVV(K).EQ.2) PTEST=PTEST+1.
      K=K+15
  305 CONTINUE
      DO 350 I=1,MAXPRO
      DO 350 J=1,I
      IF(PP(I)*QP(I).LT.QP(J)*PP(J)) GO TO 350
      SET=PP(I)
      PP(I)=PP(J)
      PP(J)=SET
      SET=QP(I)
      QP(I)=QP(J)
      QP(J)=SET
      DO 310 K=1,IRH
      ISET=IPL(K,I)
      IPL(K,I)=IPL(K,J)
      IPL(K,J)=ISET
  310 CONTINUE
      DO 320 K=1,IRH
      ISET=IPR(K,I)
      IPR(K,I)=IPR(K,J)
      IPR(K,J)=ISET
  320 CONTINUE
  350 CONTINUE
      STORE PROFILE VARIABLES IN OUTPUT ARRAY
      M=1
      L=1
      DO 510 K=1,ILH
      KK=IPL(K,1)
      IF(KK.EQ.0) GO TO 510
      IPR1(L)=IVP(KK)
      IPRV1(L)=IVVP(KK)
      L=L+1
  510 CONTINUE
```

```
      DO 520 K=1,IRH
      KK=IPR(K,1)
      IF(KK.EQ.0) GO TO 520
      IPR2(M)=IVP(KK)
      IPRV2(M)=IVVP(KK)
      M=M+1
  520 CONTINUE
      QPRO=QP(1)
      PPRO=PP(1)
      JV1=L-1
      JV2=M-1
C
C     PRINT OUTPUT
  550 CONTINUE
      IF(IQF.EQ.0.AND.JV1.EQ.0.AND.JV2.EQ.0) GO TO 910
      IF(IQF.NE.0.AND.JQV1.EQ.0.AND.JQV2.EQ.0) GO TO 920
C
C     READ DISK;  REWIND NOT OPTIONAL
C
      REWIND 2
      L=1
      J1=JV1
      J2=JV2
      IF(IQF.NE.0) J1=JQV1
      IF(IQF.NE.0) J2=JQV2
      NUMPP=J1+J2
      DO 700 N=1,NCS
      READ(2,22) (IVV(I),I=1,63)
      READ(2,24) (IVV(I),I=64,142)
      READ(2,26) (IVV(I),I=143,158),(IVV(I),I=168,171)
      IF(J1.EQ.0) GO TO 620
      DO 600 J=1,J1
      K=IPR1(J)-3
      IF(IQF.NE.0) K=IQP1(J)-3
      IPRO=IPRV1(J)
      IF(IQF.NE.0) IPRO=IQPV1(J)
      IF(IVV(K).EQ.IPRO) GO TO 620
  600 CONTINUE
      GO TO 700
  620 CONTINUE
      DO 630 J=1,J2
      K=IPR2(J)-3
      IF(IQF.NE.0) K=IQP2(J)-3
      IPRO=IPRV2(J)
      IF(IQF.NE.0) IPRO=IQPV2(J)
      IF(IVV(K).EQ.IPRO) GO TO 640
  630 CONTINUE
      GO TO 700
  640 CONTINUE
```

```
      IERV(L)=IERV(N)
      L=L+1
      WRITE(4,22) (IVV(I),I=1,63)
      WRITE(4,24) (IVV(I),I=64,142)
      WRITE(4,26) (IVV(I),I=143,158),(IVV(I),I=168,171)
  700 CONTINUE
      NCSP=L-1
      PNCSP=PPRO+NCSP
      IF(IQF.NE.0) PNCSP=QPPRO+NCSP
      PRINT 789,   NUM,PNCSP
  789 FORMAT(////' PROGRAM SEGMENT ',I5,' -- ',F9.4////)
      DO 720 K=1,NCSP,50
      K2=K+49
      WRITE(4,23) (IERV(L),L=K,K2)
  720 CONTINUE
C
C     REVERSE PATTERN
      IPASF=1
      NUM=0
      GO TO 1000
  910 CONTINUE
      PRINT 990, PINP
      GO TO 950
  920 CONTINUE
      PRINT 991, QINP
      GO TO 950
  982 CONTINUE
      PRINT 983
  983 FORMAT(' NO PROFILE POSSIBLE -- USER INPUT ERROR')
  950 CONTINUE
      STOP
 1000 CONTINUE
C
   22 FORMAT(2I2,10I1,2I2,49I1)
   24 FORMAT(79I1)
   26 FORMAT(2I2,14I1,4I4)
   23 FORMAT(50I1)
  990 FORMAT(' NO PROFILE POSSIBLE FOR TARGET FIT OF ',F8.4/)
  991 FORMAT(' NO PROFILE POSSIBLE FOR MINUMIM YIELD OF ',F8.4/)

      RETURN
      END
      END
```

```
      SUBROUTINE NATURE
C     CALCULATES AND PRINTS PROFILE AND NATURE OF ERROR OUTPUT
C
      COMMON/INTEG/ IER,IC,IARF,IPASF,IV,INV,ITYP,IQF,IWRITV,LFLAG,
     &              NPV,NLV,NTV,NUM,NUMAX,NUNMAX,NNV,NOUT,NOUT1,NOUT2,
     &              NV1,NVT1,NVT2,NUMP,NR,NV,NCS,NCSP,NVAR,MAR,NMPASS,
     &              MAXPRO,IVV(190),ID(190),NVV(190),IERV(400),
     &              IQ(2,100),IDUM(100)
C
      COMMON/REALV/ PINP,C1,C2,R,D,CAUSER(12),DOLERR(6),TOL1,TOL2,
     &              RANERR,QINP,XLEV(100)
C
      COMMON/OUTUNI/IVVR(4500),TC(47),TE(47),TNE(47),RS(47),AS(47),
     &          RP(47),AP(47),RE(47),AE(47),PTC(47),PTE(47),PTNE(47),
     &          PRS(47),PAS(47),PRP(47),PAP(47),PRE(47),PAE(47),
     &          ETE(47),ETNE(47),ERS(47),EAS(47),ERP(47),EAP(47),
     &          ERE(47),EAE(47),PRTE(47),PRTNE(47),PRRS(47),PRAS(47),
     &          PRRP(47),PRAP(47),PRRE(47),PRAE(47),
     &          Q(2,100)
C
      COMMON/PROFIL/IPR1(3),IPR2(12),IPRV1(3),IPRV2(12),IQP1(3),
     &              IQP2(12),IQPV1(3),IQPV2(12),IVP(17),IVVP(17),
     &              JV1,JV2,JQV1,JQV2,QPRO,PPRO,QQPRO,QPPRO,NUMPP,
     &              B(47),QP(17),PP(17),DP(15),DEP(15),DTEP(4)
C_______________________________________________________________________
C
      DIMENSION PLABEL(315),DLABEL(21),IPAY(1),ITYP1(1),ITYP2(1),
     & ITYP3(1),ICAUS1(1),ICAUS2(1),ICAUS3(1),CAUSTY(1),
     & IDOLL(1),TYPERR(1),PAYERR(1),CAT1(4),CAT2(4),CAT3(4),
     & REAP1(2),REAP2(2),REAP3(2),REAP4(2),REAP5(2),
     & KV1(3),KV2(12),KVV1(12),KVV2(12)
C
```

```
C
      DATA NCAUS/12/,NTYP/45/,NPAY/10/,NDOL/5/
      DATA PLABEL/'CHIL',
     &         'D OV','ER A','GE L','IMIT',' - A','FDC ',
     & 'ADUL','T UN','DER ','AGE ','65 F','OR O','AA  ',
     & 'ILLE','GAL ','ALIE','N   ','    ','    ','    ',
     & 'NOT ','A NH',' RES','IDEN','T-RE','VIEW',' PER',
     & 'CHIL','D NO','T LI','VING','-W-R','ELAT','IVE ',
     & 'INVA','LID ','LIVI','NG A','RRAN','GEME','NT  ',
     & 'NEED','Y ES','SENT','IAL ','NOT ','INCL','UDED',
     & 'NO D','EPRI','VATI','ON B','ASED',' - D','EATH',
     & 'NO D','EPRI','VATI','ON -','- IN','CAPA','CITY',
     & 'NO D','EPRI','VATI','ON/C','ONT.',' ABS','ENCE',
     & 'NO P','ROOF',' OF ','BLIN','DNES','S   ','    ',
     & 'NO P','ROOF',' OF ','DISA','BILI','TY  ','    ',
     & 'XCES','S RE','AL P','ROPE','RTY/','UNOC','CUP.',
     & 'NURS','ING ','HOME',' ACC','OUNT',' XCS','/LIM',
     & 'BANK',' ACC','OUNT','S IN',' EXC','ESS/','LIM ',
     & 'STOC',
     &         'KS/B','ONDS',' IN ','EXCE','SS/L','IMIT',
     & 'OTHE','R LI','QUID',' ASS','ETS ','XCES','/LIM',
     & 'LIFE',' INS','URAN','CE I','N EX','CESS','/LIM',
     & 'OTHE','R PE','RSON','AL P','ROPE','RTY ','XCES',
     & 'TOTA','L RE','SOUR','CES ','EXCE','SS/L','IMIT',
     & 'EARN','ED I','NCOM','E EX','CESS','IVE ','    ',
     & 'EARN','ED I','NCOM','E OV','ERST','ATED','    ',
     & 'UNEA','RNED',' INC','OME ','EXCE','SSIV','E   ',
     & 'UNEA','RNED',' INC','OME ','OVER','STAT','ED  ',
     & 'TOTA','L IN','COME',' IN ','EXCE','SS/L','IMIT',
     & 'TOO ','MANY',' DIS','REGA','RDS ','APPL','IED ',
     & 'TOO ','FEW ','DISR','EGAR','DS A','PPLI','ED  ',
     & 'DISR','EGAR','D AP','PLIE','D IN','CORR','ECT.',
     & 'GROS','S IN','COME',' OVE','R CO','UNTE','D   ',
     & 'GROS','S IN','COME',' UND','ER C','OUNT','ED  ',
     & 'TOO ',
     &         'MANY',' DED','UCTI','ONS ','APPL','IED ',
     & 'TOO ','FEW ','DEDU','CTIO','NS A','PPLI','ED  ',
     & 'MEDI','CAL ','EXPE','NSES',' OVE','RSTA','TED ',
     & 'MEDI','CAL ','EXPE','NSES',' UND','ERST','ATED',
     & 'RECI','PIEN','T LI','ABIL','. UN','DERS','TAT.',
     & 'RECI','PIEN','T LI','ABIL','. OV','ERST','ATED',
     & 'WRON','G PE','RIOD','/SPE','ND-D','OWN ','UTIL',
     & 'SPEN','D-DO','WN C','OMPU','TA/I','NCOR','RECT',
     & 'SHEL','TER ','ALLO','WANC','E IN','CORR','ECT ',
     & 'CONS','OLID','ATED',' STA','NDAR','D IN','COR.',
     & 'PROR','ATIO','N-SH','ARED',' HOM','E IN','COR.',
     & 'OTHE','R AL','LOWA','NCE ','INCO','RREC','T   ',
     & 'GRAN','DFAT','HER ','CLAU','SE A','PPL/','INCO',
     & '3RD ','PART','Y LI','ABIL','. AP','P/IN','COR.',
     & 'LEGA','L LI','AB.-','RELA','TIVE',' INC','ORR.'/
```

```
      DATA DLABEL/'TOTA','L DO','LLAR',' AMO','UNT ','OF E','RROR',
     &             ' DOL','LAR ','AMOU','NT-U','NDER','PAYM','ENT ',
     &             'DOLL','AR A','MOUN','T OF',' OVE','RPAY','MENT'/
C
      DATA CAT1/'GENE','ADUL','NURS','A-F-'/
      DATA CAT2/'RAL ','T IN','ING ','D-C '/
      DATA CAT3/'CASE','DEP.','HOME','CASE'/
      DATA REAP1/'  AP','REDE'/, REAP2/'PLIC','TERM'/,
     &     REAP3/'ATIO','INAT'/, REAP4/'N ON','ION '/,
     &     REAP5/'LY  ','ONLY'/
      EQUIVALENCE (IVVR(1),ICAUS1),(IVVR(401),ICAUS2)
      EQUIVALENCE (IVVR(801),ICAUS3),(IVVR(1201),ITYP1)
      EQUIVALENCE (IVVR(1601),ITYP2),(IVVR(2001),ITYP3)
      EQUIVALENCE (IVVR(2401),IDOLL),(IVVR(2801),IPAY)
      EQUIVALENCE(TC,CAUSTY),(TE,TYPERR),(TNE,PAYERR)
C
C
      REWIND 4
      J=1
      K=1
      N=0
      N1=NCSP-1
      IP=IVP(16)-3
C
      DO 50 I=1,NTYP
      TYPERR(I)=0.
      CAUSTY(I)=0.
      IF(I.GT.NCAUS) GO TO 50
      CAUSER(I)=0.
      IF(I.GT.NPAY) GO TO 50
      PAYERR(I)=0.
      IF(I.GT.NDOL) GO TO 50
      DOLERR(I)=0.
   50 CONTINUE
      L1=1
      L2=7
      ERRTOT=0.
      ERECIP=0.
      ERRAGN=0.
C
      P=PPRO
      QQ=QPRO
      IF(IQF.NE.0) P=QPPRO
      IF(IQF.NE.0) QQ=QQPRO
      PXQ=P*QQ
      PERERR=PXQ/RANERR
      ERRNON=(RANERR-PXQ)/(1.-P)
      ERATIO=QQ/ERRNON
      I=IC+1
      WRITE(11,501)
```

```
      WRITE(11,201) CAT1(I),CAT2(I),CAT3(I)
      IF(IARF.EQ.3) GO TO 55
      II=IARF
      WRITE(11,211) REAP1(II),REAP2(II),REAP3(II),REAP4(II),REAP5(II)
   55 CONTINUE
      IF(IQF.NE.0) GO TO 56
      WRITE(11,221) PINP,P,QQ,PERERR,ERATIO
      GO TO 57
   56 CONTINUE
      WRITE(11,222) QINP,QQ,P,PERERR,ERATIO
   57 CONTINUE
      J1=JV1
      J2=JV2
      IF(IQF.NE.0) J1=JQV1
      IF(IQF.NE.0) J2=JQV2
      L=0
      DO 520 J=1,J1
      IF(DP(J).NE.0.) GO TO 520
      JM1=J-1
      DO 515 K=J,JM1
      K1=K+1
      DP(K)=DP(K1)
      L=L+1
      IF(IQF.NE.0) GO TO 510
      IPR1(K)=IPR1(K1)
      IPRV1(K)=IPRV1(K1)
      GO TO 515
  510 CONTINUE
      IQP1(K)=IQP1(K1)
      IQPV1(K)=IQPV1(K1)
  515 CONTINUE
  520 CONTINUE
      JT=J1-L
      M=0
      DO 540 J=1,J2
      JT=JT+1
      IF(DP(JT).NE.0.) GO TO 540
      JM1=J-1
      DO 535 K=J,JM1
      K1=K+1
      JT1=JT1+1
      DP(JT)=DP(JT1)
      M=M+1
      IF(IQF.NE.0) GO TO 530
      IPR2(K)=IPR2(K1)
      IPRV2(K)=IPRV2(K1)
      GO TO 535
  530 CONTINUE
      IQP2(K)=IQP2(K1)
      IQPV2(K)=IQPV2(K1)
```

```
535 CONTINUE
540 CONTINUE
    J1=J1-L
    J2=J2-M
    JV1=J1
    JV2=J2
    IF(IQF.NE.0) JQV1=J1
    IF(IQF.NE.0) JQV2=J2
    IF(IQF.NE.0) GO TO 620
    DO 600 J=1,J1
    KV1(J)=IPR1(J)
    KVV1(J)=IPRV1(J)
600 CONTINUE
    DO 610 J=1,J2
    KV2(J)=IPR2(J)
    KVV2(J)=IPRV2(J)
610 CONTINUE
    GO TO 650
620 CONTINUE
    DO 630 J=1,J1
    KV1(J)=IQP1(J)
    KVV1(J)=IQPV1(J)
630 CONTINUE
    DO 640 J=1,J2
    KV2(J)=IQP2(J)
    KVV2(J)=IQPV2(J)
640 CONTINUE
650 CONTINUE
    J=1
    IF(J1.EQ.0) GO TO 685
    IF(IVP(16).EQ.0) GO TO 680
    WRITE(11,301) KV1(1),KVV1(1),KV2(1),KVV2(1),IVP(16),IVVP(16)
    IF(J1.EQ.1) GO TO 670
    J=2
660 WRITE(11,401) (KV1(I),KVV1(I),KV2(I),KVV2(I),I=J,J1)
670 CONTINUE
    J=J1+1
675 CONTINUE
    WRITE(11,402) (KV2(I),KVV2(I),I=J,J2)
    GO TO 60
680 CONTINUE
    WRITE(11,302)
    GO TO 660
685 CONTINUE
    IF(IVP(16).EQ.0) GO TO 690
    WRITE(11,303) KV2(1),KVV2(1),IVP(16),IVVP(16)
    J=2
    GO TO 675
690 CONTINUE
    WRITE(11,304)
```

```
      GO TO 670
 60   CONTINUE
      I=1
      DO 100 IK=1,NCSP
 10   CONTINUE
      READ(4,22) (IVV(J),J=1,63)
      READ(4,24) (IVV(J),J=64,142)
      READ(4,26) (IVV(J),J=143,158),ICAUS1(I),ICAUS2(I),ICAUS3(I)
     & ,IDOLL(I)
      IF(IP.LE.0) GO TO 20
      IF(IVV(IP).NE.IVVP(16)) GO TO 20
      IF(IK.EQ.NCSP) GO TO 100
      DO 15 M=I,N1
      M1=M+1
      IERV(M)=IERV(M1)
 15   CONTINUE
      GO TO 100
 20   CONTINUE
      ITEMP=MOD(ICAUS1(I),100)
      ITYP1(I)=(ICAUS1(I)-ITEMP)/100
      ICAUS1(I)=ITEMP
      ITEMP=MOD(ICAUS2(I),100)
      ITYP2(I)=(ICAUS2(I)-ITEMP)/100
      ICAUS2(I)=ITEMP
      ITEMP=MOD(ICAUS3(I),100)
      ITYP3(I)=(ICAUS3(I)-ITEMP)/100
      ICAUS3(I)=ITEMP
      ITEMP=MOD(IDOLL(I),100)
      ITEMP1=MOD(ITEMP,10)
      IPAY(I)=(IDOLL(I)-ITEMP1)/10
      IDOLL(I)=ITEMP1
      I=I+1
100   CONTINUE
      NCSP=I-1

      DO 150 I=1,NCSP
      IF(IERV(I).NE.0) ERRTOT=ERRTOT+1.
      IF(IERV(I).EQ.1) ERECIP=ERECIP+1.
      IF(IERV(I).EQ.2) ERRAGN=ERRAGN+1.
      IF(IERV(I).LT.3) GO TO 150
      IF(ICAUS1(I).GT.3) ERRAGN=ERRAGN+1.
      IF(ICAUS1(I).LE.3) ERECIP=ERECIP+1.
150   CONTINUE
      DO 300 I=1,NCSP
      DO 300 J=1,NTYP
      IF(ITYP2(I).EQ.ITYP1(I)) ITYP2(I)=0
      IF(ITYP3(I).EQ.ITYP1(I)) ITYP3(I)=0
      IF(ITYP3(I).EQ.ITYP2(I)) ITYP3(I)=0
      IF(ITYP1(I).EQ.J) TYPERR(J)=TYPERR(J)+1.
      IF(J.GT.12) GO TO 300
```

```
      IF(ICAUS2(I).EQ.ICAUS1(I)) ICAUS2(I)=0
      IF(ICAUS3(I).EQ.ICAUS1(I)) ICAUS3(I)=0
      IF(ICAUS3(I).EQ.ICAUS2(I)) ICAUS3(I)=0
      IF(ICAUS1(I).EQ.J) CAUSER(J)=CAUSER(J)+1.
  250 CONTINUE
      IF(J.GT.NPAY) GO TO 300
      IF(IPAY(I).EQ.J) PAYERR(J)=PAYERR(J)+1.
      IF(J.GT.NDOL) GO TO 300
      IF(IDOLL(I).EQ.J) DOLERR(J)=DOLERR(J)+1.
  300 CONTINUE
      TCAUS1=CAUSER(1)+CAUSER(2)+CAUSER(3)
      TCAUS2=CAUSER(4)+CAUSER(5)+CAUSER(6)+CAUSER(7)+CAUSER(8)
      TCAUS2=TCAUS2+CAUSER(9)+CAUSER(10)+CAUSER(11)+CAUSER(12)
C
      DO 400 I=1,NTYP
      TYPERR(I)=TYPERR(I)/ERRTOT
      IF(I.GT.NCAUS) GO TO 400
      IF(I.GT.3) CAUSER(I)=CAUSER(I)/TCAUS2
      IF(I.LE.3) CAUSER(I)=CAUSER(I)/TCAUS1
      IF(I.GT.NPAY) GO TO 400
      PAYERR(I)=PAYERR(I)/ERRTOT
      IF(I.GT.NDOL) GO TO 400
      DOLERR(I)=DOLERR(I)/ERRTOT
  400 CONTINUE
      ERECIP=ERECIP/ERRTOT
      ERRAGN=ERRAGN/ERRTOT
C
      WRITE(11,501)
      WRITE(11,101) ERECIP,CAUSER(1),CAUSER(2),CAUSER(3)
      WRITE(11,102) ERRAGN,(CAUSER(I),I=4,12)
      WRITE(11,501)
      WRITE(11,103)
      DO 500 M=1,NTYP
      IF(TYPERR(M).EQ.0.) GO TO 475
      WRITE(11,104) M,(PLABEL(L),L=L1,L2),TYPERR(M)
  475 CONTINUE
      L1=L1+7
      L2=L2+7
  500 CONTINUE
C
C     WRITE(6,1001) (DLABEL(I),I=1,7),(DOLERR(I),I=1,NDOL)
C     WRITE(6,1001) (DLABEL(I),I=8,14),(PAYERR(I),I=1,NDOL)
C     WRITE(6,1001) (DLABEL(I),I=15,21),(PAYERR(I),I=6,10)
      WRITE(11,501)
      CALL WRITPR(1)
      WRITE(11,105) RANERR,QQ,ERRNON,PERERR
C
   23 FORMAT(50I1)
   22 FORMAT(2I2,10I1,2I2,49I1)
   24 FORMAT(79I1)
```

```
 26 FORMAT(2I2,14I1,4I4)
101 FORMAT(/32X,'CAUSE OF ERRORS'/32X,15('_')///,14X,'CAUSE OF ',
   & 'ERROR',40X,'PERCENTAGE'/14X,14('_'),40X,10('_')///
   & 5X,'RECIPIENT ERRORS ONLY',2X,F8.4,' PERCENT OF TOTAL ERROR'
   & ///2X,'1  CHANGE IN CIRCUMSTANCES NOT REPORTED',29X,F6.4/
   & 2X,'2  INFORMATION IS INCORRECT',41X,F6.4/
   & 2X,'3  INFORMATION IS INCOMPLETE',40X,F6.4/70X,'______',/70X,
   & '1.0000')
102 FORMAT(//5X,'AGENCY ERRORS ONLY',2X,F8.4,' PERCENT TOTAL '
   & ,'ERROR'//2X,'4  CORRECT POLICY-WRONG APPLICATION',33X,
   & F6.4/2X,'5  WRONG POLICY APPLIED',45X,
   & F6.4/2X,'6  REPORTED INFO NOT APPL./IGNORED',34X,
   & F6.4/2X,'7  FAILURE TO FOLLOW UP ON IMPENDING CHANGES',24X,
   & F6.4/2X,'8  DID NOY FOLLOW UP ON INCONSISTANT/INCOMPL.',
   & ' INFO',18X,
   & F6.4/2X,'9  DID NOT VERIFY WHERE REQUIRED BY AGENCY POLICY'
   & ,19X,F6.4/1X,'10  ARITHMETIC COMPUTATION',43X,
   & F6.4/1X,'11  INFO. FROM SSA IS INACCURATE',37X,
   & F6.4/1X,'12  INFO. FROM SSA IS MISUSED BY STATE AGENCY',24X,
   & F6.4/70X,'______'/70X,'1.0000'////)
103 FORMAT(/20X,'DISTRIBUTION OF TYPES OF ERROR COMMITTED'/,
   & 20X,40('*')///
   & 14X,'INDEX',4X,'TYPE OF ERROR',19X,'PERCENTAGE'/14X,'_____',4X,
   & 13('_'),19X,10('_')///)
104 FORMAT(16X,I2,5X,7A4,4X,F6.4)
105 FORMAT(////31X,18('*')///
   & 20X,'RANDOM ERROR RATE IS                  ',F6.4/
   & 20X,'PROFILE ERROR RATE                    ',F6.4/
   & 20X,'NON-PROFILE ERROR RATE                ',F6.4/
   & 20X,'% OF TOTAL ERRORS IN PROFILE CASES ',F6.4///////)
1001 FORMAT(//////////45X,7A4/45X,28('_'),
   & //48X,'DOLLARS',5X,'PERCENTAGE'//
   & 48X,'1-99',11X,F6.4/48X,'100-499',8X,F6.4/
   & 48X,'500-999',8X,F6.4/48X,'1000-5000',6X,F6.4/
   & 48X,'OVER-5000',6X,F6.4)
201 FORMAT(/36X,3A4,' PROFILE')
211 FORMAT(36X,5A4)
221 FORMAT(36X,20('_')///
   & 34X,'   TARGET FIT = ',F6.4/34X,'  PROFILE FIT = ',F6.4/
   & 34X,'PROFILE YIELD = ',F6.4/33X,'% TOTAL ERRORS = ',
   &  F6.4/31X,'ERROR RATE RATIO = ',F6.4//////)
222 FORMAT(36X,20('_')///
   & 34X,'MINIMUM YIELD = ',F6.4/34X,'PROFILE YIELD = ',F6.4/
   & 34X,'  PROFILE FIT = ',F6.4,/30X,'% OF TOTAL ERRORS = ',
   & F6.4/31X,'ERROR RATE RATIO = ',F6.4///)
```

```
301 FORMAT(3X,'RECIPIENT MUST HAVE AT',7X,'RECIPIENT MUST ',
   & 'HAVE AT',8X,'RECIPIENT MUST'/1X,'LEAST ONE OF ',
   & 'THE FOLLOWING',3X,'LEAST ONE OF THE FOLLOWING',9X,
   & 'NOT HAVE'//4X,'VAR #',
   & 7X,'VALUE',11X,'VAR #',7X,'VALUE',11X,'VAR #',7X,'VALUE'/
   & 4X,'_____',7X,'_____',11X,'_____',7X,'_____',11X,'_____',
   & 7X,'_____'//5X,I3,9X,I3,13X,I3,9X,I3,13X,I3,
   & 9X,I3//)
302 FORMAT(3X,'RECIPIENT MUST HAVE AT',7X,'RECIPIENT',
   & ' MUST HAVE AT'/1X,'LEAST ONE OF THE FOLLOWING',3X,
   & 'LEAST ONE OF THE FOLLOWING'//4X,'VAR #',7X,'VALUE',11X,
   & 'VAR #',7X,'VALUE'/4X,'_____',7X,'_____',11X,'_____',7X,'_____',
   & 7X,'_____'//)
303 FORMAT(31X,'RECIPIENT MUST HAVE AT',8X,'RECIPIENT MUST',
   &  /29X,'LEAST ONE OF THE FOLLOWING',9X,'NOT HAVE'//32X,'VAR #',
   & 7X,'VALUE',11X,'VAR #',7X,'VALUE'/32X,'_____',7X,'_____',
   & 11X,'_____',7X,'_____'//33X,I3,9X,I3,13X,I3,9X,I3/)
304 FORMAT(31X,'RECIPIENT MUST HAVE AT'//29X,'LEAST ONE OF',
   & ' THE FOLLOWING'//32X,'VAR #'7X,'VALUE'/32X,
   & '_____',7X,'_____'//)
401 FORMAT(5X,I3,9X,I3,13X,I3,9X,I3/)
402 FORMAT(33X,I3,9X,I3/)
501 FORMAT(////////////////)
    RETURN
    END
```

Appendix B

USERS MANUAL FOR NEW HAMPSHIRE HONEYWELL 6600

INSTRUCTION LIST

The following page gives a list of instructions for running the program. The responses are given at the terminal. Note that:

- All USER response are UNDERLINED;
- all parenthetical statements are procedures and are not to be taken as literal instructions;
- the spaces indicated by the typewriter must be entered with the space bar at the terminal; do not add spaces where not indicated;
- a carriage return follows each user response.

In the special case of the "restart" option, follow the same instructions omitting the line GET CASE "03".

(DIAL COMPUTER ON TELEPHONE)

ST. OF N.H. C.D.P.

USER ID-(FOR ACCOUNTING PROCEDURES, COMPUTER SERVICES SUPPLIES THE USER
WITH AN IDENTIFICATION NUMBER WHICH IS TYPED IN HERE)

PASSWORD

(TYPE IN PASSWORD SUPPLIED BY COMPUTER SERVICES)

*FORTRAN

*GET CASES "03"

*GET AIDCAS "02"

*GET AIDVAR "08"

*GET PROCAS "04"

*GET OUTPUT "11"

*RUN MEDPS

(COMPUTER QUERRIES THE USER FOR PROGRAM INPUT -- SEE NEXT PAGE)

MEDICAID PROFILE COMPLETED

*BYE

CP DISCONNECTS

(DIAL COMPUTER AFTER WAITING APPROXIMATELY 15 MINUTES; THIS INTERACTION
OBTAINS THE OUTPUT OF THE COMPUTER RUN)

ST. OF N.H. C.D.P.

USER ID-(FOR ACCOUNTING PROCEDURES, COMPUTER SERVICES SUPPLIES THE USER
WITH AN IDENTIFICATION NUMBER WHICH IS TYPED IN HERE)

PASSWORD
(TYPE IN PASSWORD SUPPLIED BY COMPUTER SERVICES)

*OLD OUTPUT

*EDIT

-P;*

(COMPUTER PRINTS PROGRAM OUTPUT)

-DONE

*

DISCONNECTS

EXPLANATION OF INSTRUCTIONS

It is not necessary for the user to understand the explanation of the instructions given here. It is possible, however, that if the meaning of the instructions is enhanced, the commands will be more readily automated.

The dial-up, USER ID, PASSWORD sequence is the procedure that allows the user to communicate with the computer. The BYE command terminates the session. The statements beginning with GET tell the computer to get the disk files that the program needs:

CASES stores the master data base;

AIDCAS stores the cases for the aid category that the user selects;

AIDVAR stores the significant variables for the chosen aid category;

PROCAS stores the cases that fit the profile;

OUTPUT stores the printed output generated by the program.

The name of the program is MEDPS for Medicaid Profile System.

The Honeywell needs about fifteen minutes to realize that a file is no longer being used. It is recommended that the user terminate the session and return later to print the output (OLD, EDIT, P;*).

PROGRAM INPUT

Program input is discussed in detail in the body of the report. These two examples here should be helpful in executing the input sequence. Note that, in the examples, all the responses including the "=" sign are given by the computer. The user merely types in the desired number.

In Example I, the user selects "restart" because he has already made a run for Adult Independent cases that included application and redetermination errors. This time the profile is based on a minimum yield of seventy-five percent. On the previous run the profile may have been based on a target fit or a different yield.

Suppose that the user now wishes to examine only redetermination errors, or only application errors or a different aid category, the user must run the entire program, not "restart" the program. This time, (Example II), the user does not type "1" for restart and finds a profile based on a fit of twenty percent for Nursing Home cases. He still desires to include both redetermination and application errors.

When the program is finished the message MEDICAID PROFILE COMPLETED appears. If the program failed to find a profile, an error message will be given. A target fit over 30% is not recommended.

NO PROFILE POSSIBLE FOR TARGET FIT OR
NO PROFILE POSSIBLE FOR MINIMUM YIELD OR
NO TARGET FIT PROFILE POSSIBLE WITHIN PRESCRIBED TOLERANCE:
(SUGGESTION FOR SUBSEQUENT PROCEDURE)

EXAMPLE I

YIELD PROFILE

```
IF THIS IS A RESTART RUN, ENTER 1 AND HIT CARRIAGE RETURN;
OTHERWISE JUST HIT CARRIAGE RETURN

=1

TO INCLUDE BOTH APPLICATION & REDETERMINATION ERRORS USE CARRIAGE
RETURN; OTHERWISE, ENTER 1 FOR APPLICATION ERRORS ONLY.
ENTER 2 FOR REDETERMINATION ERRORS ONLY.

=

ENTER 1 FOR ADULT INDEPENDENT PROFILE. ENTER 2 FOR
NURSING HOME PROFILE. ENTER 3 FOR AFDC PROFILE.

=1

ENTER FORM OF PROFILE DESIRED. ENTER 1 FOR FIT(OR 'P'),
ENTER 2 FOR YIELD (OR 'Q') PROFILE.

=2

ENTER FIT OR YIELD VALUE DESIRED.  BEGIN WITH DECIMAL POINT.

=.75
```

EXAMPLE II

FIT PROFILE

```
IF THIS IS A RESTART RUN, ENTER 1 AND HIT CARRIAGE RETURN;
OTHERWISE JUST HIT CARRIAGE RETURN

=

TO INCLUDE BOTH APPLICATION & REDETERMINATION ERRORS USE CARRIAGE
RETURN; OTHERWISE, ENTER 1 FOR APPLICATION ERRORS ONLY.
ENTER 2 FOR REDETERMINATION ERRORS ONLY.

=

ENTER 1 FOR ADULT INDEPENDENT PROFILE. ENTER 2 FOR
NURSING HOME PROFILE. ENTER 3 FOR AFDC PROFILE.

=2

ENTER FORM OF PROFILE DESIRED. ENTER 1 FOR FIT(OR 'P'),
ENTER 2 FOR YIELD (OR 'Q') PROFILE.

=1

ENTER FIT OR YIELD VALUE DESIRED.  BEGIN WITH DECIMAL POINT.

=.2
```

Appendix C

QUESTIONNAIRES AND CODE SHEETS
USED FOR INTENSIVE SEQUENTIAL REVIEW

TITLE XIX DEMONSTRATION PROJECT

Questionnaire for

Adult Related Recipients

Recipient Name____
Last First M. Initial

1. Case Number 1. _ _ _ _ - _ _ _ _ _

2. Review Number 2._ _ _

3. Review Period 3._ _ _ _ _ _ _ _

4. MA coverage code used by agency 4._ _

01) OAA Related-10	08) OAA Related-88	15) In & Out-88
02) AFDC Related-20	09) AFDC Related-82	16) In & Out-82
03) ANB Related-30	10) ANB Related-83	17) In & Out-83
04) CWS Related-40	11) CWS Related-84	18) In & Out-84
05) OAA-A Related-60	12) OAA-A Related-86	19) In & Out-86
06) APTD Related-70	13) APTD Related-87	20) In & Out-87
07) APTD Related (mental)-50	14) APTD Related (mental)-85	21) In & Out-85

5. District Office during review period 5._ _

01) Keene	09) Berlin	17) Rochester
02) Claremont	10) Manchester East	18) Plymouth
03) Laconia	11) Nashua	
04) Conway	12) Manchester West (30)	
05) Concord	13) Peterborough (20)	
06) Portsmouth	14) Lebanon (28)	
07) Dover	15) Franklin	
08) Woodsville	16) Salem	

6. Type of case action during review period 6._
   1) new application during review period
   2) redetermination scheduled during review period
   3) redetermination scheduled outside review period

7. For redetermination due during or prior to review period was redetermination 7._
   0) No redetermination due before or during review period
   1) performed on schedule
   2) less than 1 month overdue
   3) 1 to 3 months overdue
   4) 4 to 6 months overdue
   5) 7 to 12 months overdue
   6) more than 1 year overdue

8. Was case closed during review period? 8._
   1) yes 2) no

9. Number of times recipient's case was opened or closed (change in category of coverage does not count as closing) 9._
   1) 1
   2) 2
   3) 3
   4) 4 or more

10. Length of time since original application whether approved or denied 10.____
1) during review period
2) 0 to 12 months prior to review period
3) 13 to 24 months prior to review period (between 1 & 2 years)
4) 25 to 60 months prior to review period (between 2 & 5 years)
5) more than 60 months (5 years) prior to review period but after 07/67
6) before July, 1967

11. Were SSA benefits pending at the time of initial application? 11.____
1) yes 2) no

12. Age of recipient on date of initial application 12.____
1) under 65
2) 65
3) 66 - 70
4) 71 - 75
5) over 75

13. Age 13.____
1) 0 - 17
2) 18 - 20
3) 21 - 64
4) 65 and over

14. Citizenship - Alienage 14.____
1) citizen
2) registered alien
3) illegal alien

15. Recipient's sex 15.____
1) male 2) female

16. Highest grade completed by recipient 16.____
1) none
2) 1 to 8
3) 9 to 12
4) post high school
5) unknown

17. Marital status during review period 17.____
1) married and living together
2) married and living apart
3) legally separated/divorced
4) never married
5) widowed

18. If married and living together did spouse receive MA during review period? 18.____
0) recipient was not married or not living with spouse during review period
1) yes
2) no

19. If married and living together was spouse employed during review period? 19.____
0) recipient was not married or not living with spouse during review period
1) yes
2) no

20. Type of Non-Institutional Residence during review period 20.____
    0) recipient was institutionalized during entire review period
    1) public housing
    2) apartment
    3) boarding house/living in another's home
    4) home owned, current mortgage
    5) home owned, no mortgage
    6) home rented
    7) other - identify____

21. Population of town recipient resided in during review period (use chart) 21.____
    0) recipient was institutionalized for entire review period
    1) 1 to 1,000
    2) 1,001 to 5,000
    3) 5,001 to 15,000
    4) 15,001 to 50,000
    5) 50,001 to 100,000

22. Employment density in community where recipient resided during review period (use chart) 22.____
    0) recipient was institutionalized during entire review period
    1) small
    2) medium
    3) heavy

23. Number of residency changes in the three years prior to review period 23.____
    1) none
    2) 1
    3) 2
    4) 3 or more

24. Number of recipient's relatives in household during review period 24.____
    0) recipient was institutionalized during <u>entire</u> review period
    1) none
    2) 1
    3) 2
    4) 3
    5) more than 3

25. Number of persons in household not related to recipient (during review period) 25.____
    0) recipient was institutionalized during <u>entire</u> review period
    1) none
    2) 1
    3) 2
    4) 3
    5) more than 3

26. Total number of persons in household during review period 26.____
    0) recipient was institutionalized during entire review period
    1) 1
    2) 2
    3) 3
    4) more than 3

27. Type of Institutional Residence during review period 27.____
 0) recipient had an independent living arrangement during entire review period
 1) intermediate care facility
 2) skilled nursing facility
 3) hospital
 4) other group living facility

28. Nursing home is 28.____
 0) recipient was not in a nursing home during review period
 1) public
 2) private

29. Number of licensed beds in nursing home during review period 29.____
 0) recipient was not in nursing home during review period
 1) 0 to 49
 2) 50 to 99
 3) 100 to 149
 4) 150 to 199
 5) 200 to 249
 6) 250 to 299
 7) 300 or more

30. Since MA acceptance recipient has lived in this or any institution for 30.____
 0) recipient was not institutionalized during review period
 1) less than 1 year
 2) 1 to 2 years
 3) 2 to 3 years
 4) 3 to 5 years
 5) over 5 years

31. Does form 273 or 278 indicate that recipient had a recipient liability during review period? 31.____
 0) recipient was not in a nursing home during review period
 1) yes
 2) no

32. During review period were recipient's funds managed either partially or totally by someone other than the recipient? 32.____
 1) yes 2) no

33. Was there evidence of earned income during review period? 33.____
 1) yes, reported 2) yes, unreported 3) no

Answer "0" for questions 34, 35, 36, below if there was no reported employment during review period.

34. Employment status if reported 34.____
 0) no reported employment during review period
 1) full time (20 hours or more)
 2) part time (less than 20 hours)

35. Type of reported employment 35.____
 0) no reported employment during review period
 1) continuous
 2) sporadic
 3) seasonal

36. Location of reported employment 36.____
   0) no reported employment during review period
   1) N.H.
   2) another state
   3) both

Unearned Income During Review Period

37.	Social Security	1) yes, reported	2) yes, unreported	3) no	37.____
38.	SSI	1) yes, reported	2) yes, unreported	3) no	38.____
39.	Railroad Retirement	1) yes, reported	2) yes, unreported	3) no	39.____
40.	Veterans Benefits	1) yes, reported	2) yes, unreported	3) no	40.____
41.	Pension	1) yes, reported	2) yes, unreported	3) no	41.____
42.	Inheritance	1) yes, reported	2) yes, unreported	3) no	42.____
43.	Contributions from relatives or others	1) yes, reported	2) yes, unreported	3) no	43.____
44.	Other unearned income	1) yes, reported	2) yes, unreported	3) no	44.____

Resources During Review Period

45. Did recipient own a home in N.H. occupied by recipient or spouse? 45.____
   1) yes, owned individually and reported
   2) yes, owned individually but unreported
   3) yes, owned jointly and reported
   4) yes, owned jointly but unreported
   5) no

46. Did recipient own property in N.H. not occupied by recipient or spouse? 46.____
   1) yes, owned individually and reported
   2) yes, owned individually but unreported
   3) yes, owned jointly and reported
   4) yes, owned jointly but unreported
   5) no

47. Did recipient dispose of property within 3 years prior to review period? 47.____
   1) yes, reported
   2) yes, unreported
   3) no

48. Was the recipient the owner of an individual or fraternal life insurance policy? 48.____
   1) yes, reported 2) yes, unreported 3) no

49. Was the recipient the owner of an individual bank account? 49.____
   1) yes, in N.H. and reported
   2) yes, in N.H. but unreported
   3) yes, out of state and reported
   4) yes, out of state but unreported
   5) no

50. Was the recipient an owner of a joint bank account — 50.____
1) yes, in N.H. and reported
2) yes, in N.H. but unreported
3) yes, out of state and reported
4) yes, out of state but unreported
5) no

51. Did recipient have a personal account in Nursing Home? — 51.____
0) recipient was not in nursing home during review period
1) yes, reported
2) yes, unreported
3) no

52. Amount in personal account — 52.____
0) recipient was not in nursing home during review period
1) nursing home patient did not have a personal account
2) under $750.00
3) $750.00 to $2500.00
4) over $2500.00

53. Did the recipient have a burial arrangement? — 53.____
1) yes, written contract and reported
2) yes, written contract but unreported
3) yes, without written contract and reported
4) yes, without written contract but unreported
5) no

54. Medicare Part A 1) yes, reported 2) yes, unreported 3) no — 54.____

55. Medicare Part B 1) yes, reported 2) yes, unreported 3) no — 55.____

56. Blue Cross 1) yes, reported 2) yes, unreported 3) no — 56.____

57. Automobile owned by recipient during review period — 57.____
1) yes 2) no

58. Other resources or medical insurance - identify____________________ — 58.____
1) yes, reported 2) yes, unreported 3) no

60. ANB/APTD ONLY - Does form 176 indicate that disability exists during entire review period? — 60.____
0) recipient was neither APTD nor ANB related
1) yes
2) no

75. Total dollar amount of claims paid during review period — 75.______

76. Number of months case was open during review period — 76.____
1) one month
2) two months
3) three months
4) four months
5) five months
6) six months

77. Cost of review through Level 1 — 77.______

78. Cumulative cost of review through Level 2 78.______

79. Comulative cost of review through Level 3 79.______

80. Cumulative cost of review through Level 4 80.______

81. Enter whichever of the following 2 digit answer codes best describes the case situation <u>during the review period</u>: 81.___ ___

<u>NO ERROR</u>

01 - Recipient was eligible entire period of coverage, with no payment error

<u>PAYMENT ERRORS ONLY</u> - 02 through 09

02 - Recipient was eligible entire period of coverage, but client liability for nursing home care was <u>over</u>stated.

03 - Recipient was eligible entire period of coverage, but client liability toward nursing home care was <u>under</u>stated.

04 - Recipient was eligible entire period of coverage, but client liability toward "spend down" in MA In & Out situation was <u>over</u>stated.

05 - Recipient was eligible entire period of coverage, but client liability toward "spend down" in MA In & Out was <u>under</u>stated.

06 - Recipient was eligible entire period of coverage but third party liability coverage (co-insurance) not applied correctly.

07 - Recipient was eligible entire period of coverage, but a combination recipient and third party liability error existed.

08 - Recipient was eligible for MA, but not for specific service rendered

09 - Legal liability of relative(s) not applied correctly.

<u>ELIGIBILITY ERRORS</u> - 10 & 11

10 - Client liability <u>so</u> understated in "spend down" for MA In & Out that he (she) should have been ineligible for part or all of review period.

11 - Recipient was ineligible for MA during part or all of review period - not due to liability problem.

<u>COMBINED PAYMENT & ELIGIBILITY ERROR</u> - 12

12 - Recipient was ineligible during part of review period; liability problem also existed during a different part of review period.

<u>NOTE</u>: <u>STOP HERE IF QUESTION 81 IS CODED 01</u> - <u>NO ERROR</u>

TITLE XIX DEMONSTRATION PROJECT

Questionnaire for

AFDC - CWS Related Recipients

Recipient Name ____
Last First M. Initial

1. Case Number 1._ _ _ _ - _ _ _ _ _

2. Review Number 2._ _ _

3. Review period 3._ _ _ _ _ _ _ _

4. MA Coverage code used by agency 4._ _

01) OAA Related-10	08) OAA Related-88	15) In & Out-88
02) AFDC Related-20	09) AFDC Related-82	16) In & Out-82
03) ANB Related-30	10) ANB Related-83	17) In & Out-83
04) CWS Related-40	11) CWS Related-84	18) In & Out-84
05) OAA-A Related-60	12) OAA-A Related-86	19) In & Out-86
06) APTD Related-70	13) APTD Related-87	20) In & Out-87
07) APTD Related (Mental)-50	14) APTD Related (Mental)-85	21) In & Out-85

5. District Office during review period 5._ _

01) Keene	09) Berlin	17) Rochester
02) Claremont	10) Manchester (East)	18) Plymouth
03) Laconia	11) Nashua	
04) Conway	12) Manchester West (30)	
05) Concord	13) Peterborough (20)	
06) Portsmouth	14) Lebanon (28)	
07) Dover	15) Franklin	
08) Woodsville	16) Salem	

6. Type of case action 6.____
   1) new application during review period
   2) redetermination scheduled during review period
   3) redetermination scheduled outside review period

7. For cases with redetermination <u>due</u> during or prior to review period was the redetermination 7.____
   0) no redetermination due before or during review period
   1) performed on schedule
   2) less than 1 month overdue
   3) 1 to 3 months overdue
   4) 4 to 6 months overdue
   5) 7 to 12 months overdue
   6) more than 1 year overdue

8. Was case closed during review period? 8.____
   1) yes 2) no

9. Number of times AFDC MA group's (or CWS recipient's) case was opened or closed (change in category of coverage does not count as closing) 9.____
   1) 1
   2) 2
   3) 3
   4) 4 or more

10. Length of time since original application whether approved or denied 10.____
   1) during review period
   2) 0 to 12 months prior to review period (between 1 & 2 years)
   3) 13 to 24 months prior to review period (between 1 & 2 years)
   4) 25 to 60 months prior to review period (between 2 & 5 years)
   5) more than 60 months (5 years) prior to review period but after 07/67
   6) before July, 1967

11. Were SSA benefits PENDING for anyone in AFDC MA group (or CWS recipient) at the time of application for MA? 11.____
   1) yes 2) no

Variables which ask for information about "case name" should be answered for recipient instead of "case name" if case name is a "payee relative not included".

13. Age of AFDC case name (or CWS recipient) 13.____
   1) 0 - 17
   2) 18 - 20
   3) 21 - 64
   4) 65 and over

14. Citizenship - Alienage of AFDC case name (or CWS recipient) 14.____
   1) citizen
   2) registered alien
   3) illegal alien

15. Sex of AFDC case name (or CWS recipient) 1) male 2) female 15.____

17. Marital status of AFDC case name (or CWS recipient) during review period 17.____
   1) married and living together
   2) married and living apart
   3) legally separated/divorced
   4) never married
   5) widowed

18. If married and living together at the time did spouse of AFDC case name (or CWS recipient) receive MA during review period? 18.____
   0) AFDC case name (or CWS recipient) not married or living with spouse during review period
   1) yes
   2) no

19. Was spouse of AFDC case name (or CWS recipient)employed during review period? 19.____
   0) AFDC case name (or CWS recipient) not married or living with spouse during review period
   1) yes, reported
   2) yes, unreported
   3) no

20. Type of Non-Institutional Residence during review period 20.____
    0) recipient was only member of MA group and was institutionalized during <u>entire</u> review period
    1) public housing
    2) apartment
    3) boarding house/living in another's home
    4) home owned, current mortgage
    5) home owned, no mortgage
    6) home rented
    7) other - identify________________________________

21. Population of town AFDC case name (or CWS recipient) resided in during review period (use chart) 21.____
    1) 1 to 1,000
    2) 1,001 to 5,000
    3) 5,001 to 15,000
    4) 15,001 to 50,000
    5) 50,001 to 100,000

22. Employment density in community where AFDC MA group (or CWS recipient) resided during review period (use chart) 22.____
    0) recipient was institutionalized during <u>entire</u> review period
    1) small
    2) medium
    3) heavy

23. Number of residency changes of AFDC case name (or CWS recipient) in the three years prior to review period 23.____
    1) none
    2) 1
    3) 2
    4) 3 or more

24. Number of persons in household, related to AFDC case name (or CWS recipient) during review period 24.____
    0) recipient was institutionalized during <u>entire</u> review period
    1) none
    2) 1
    3) 2
    4) 3
    5) more than 3

25. Number of persons in household not related to AFDC case name (or CWS recipient) during review period 25.____
    0) recipient was institutionalized during <u>entire</u> review period
    1) none
    2) 1
    3) 2
    4) 3
    5) more than 3

26. Total number of persons in household during review period 26.____
    0) recipient was institutionalized during the <u>entire</u> review period
    1) 1
    2) 2
    3) 3
    4) more than 3

32. During review period were AFDC MA group's (or CWS recipient's) funds managed either totally or partially by someone not included in the AFDC MA group (or CWS recipient)? 32.____
1) yes 2) no

33. Was there evidence of earned income during review period for anyone in AFDC MA group (or CWS recipient) 33.____
1) yes, reported 2) yes, unreported 3) no

Answer "0" for #34, 35, & 36 below if there was no reported employment during review period.

34. Reported employment status of principal wage earner in AFDC MA group (or CWS recipient) during the review period 34.____
0) no reported employment during review period
1) full time (20 hours or more)
2) part time (less than 20 hours)

35. Type of reported employment of principal wage earner of AFDC MA group (or CWS recipient) during the review period 35.____
0) no reported employment during review period
1) continuous
2) sporadic
3) seasonal

36. Location of reported employment of principal wage earner in AFDC MA group (or CWS recipient) during the review period. 36.____
0) no reported employment during review period
1) New Hampshire
2) another state
3) both

Unearned Income During Review Period for anyone in AFDC MA group (or CWS recipient)

37. Social Security 1) yes, reported 2) yes, unreported 3) no 37.____

38. SSI 1) yes, reported 2) yes, unreported 3) no 38.____

39. Railroad Retirement 1) yes, reported 2) yes, unreported 3) no 39.____

40. Veterans Benefits 1) yes, reported 2) yes, unreported 3) no 40.____

41. Pension 1) yes, reported 2) yes, unreported 3) no 41.____

42. Inheritance 1) yes, reported 2) yes, unreported 3) no 42.____

43. Contributions from relatives or other
1) yes, reported 2) yes, unreported 3) no 43.____

44. Other unearned income 1) yes, reported 2) yes, unreported 3) no 44.____

Resources During Review Period for anyone in AFDC MA group (or CWS recipient)

45. Home owned in N.H. occupied by anyone in AFDC MA group (or CWS recipient) 45.____
1) yes, owned individually and reported
2) yes, owned individually but unreported
3) yes, owned jointly and reported
4) yes, owned jointly but unreported
5) no

46. Property owned in N.H. not occupied by anyone in AFDC MA group (or CWS recipient) 46.____
1) yes, owned individually and reported
2) yes, owned individually but unreported
3) yes, owned jointly and reported
4) yes, owned jointly but unreported
5) no

47. Disposal of property in 3 years prior to review period by anyone in AFDC MA group (or CWS recipient) 47.____
1) yes, reported
2) yes, unreported
3) no

48. Was anyone in AFDC MA group (or CWS recipient) the owner of an individual or fraternal life insurance policy? 48.____
1) yes, reported 2) yes, unreported 3) no

49. Was anyone in AFDC MA group (or CWS recipient) an owner of an individual bank account? 49.____
1) yes, in N.H. and reported
2) yes, in N.H. but unreported
3) yes, out of state and reported
4) yes, out of state but unreported
5) no

50. Was anyone in AFDC MA group (or CWS recipient) an owner of a joint bank account? 50.____
1) yes, in N.H. and reported
2) yes, in N.H. but unreported
3) yes, out of state and reported
4) yes, out of state but unreported
5) no

53. Did anyone in AFDC MA group (or CWS recipient) have a burial arrangement? 53.____
1) yes, written contract and reported
2) yes, with written contract but unreported
3) yes, without written contract and reported
4) yes, without written contract but unreported
5) no

54. Medicare part A 1) yes, reported 2) yes, unreported 3) no 54.____

55. Medicare part B 1) yes, reported 2) yes, unreported 3) no 55.____

56. Blue Cross 1) yes, reported 2) yes, unreported 3) no 56.____

57. Automobile owned by anyone in AFDC MA group (or CWS recipient) during review period 57.____
1) yes 2) no

58. Other resources or medical insurance for anyone in AFDC MA group (or CWS recipient) - identify________________________ 58.____
1) yes, reported 2) yes, unreported 3) no

59. AFDC children were deprived of parental care/support because of 59.____
0) not an AFDC case
1) death of parent
2) incapacity of parent
3) continued absence of parent

60. If AFDC deprivation was incapacity, was form 176 (current for review period) available in case record? 60.____
0) not an AFDC case or deprivation factor was not incapacity
1) yes
2) no

61. Number of persons in MA group during review period 61.____
1) 1
2) 2
3) 3
4) 4
5) more than 4

62. During review period MA group consisted of 62.____
1) mother and children
2) father and children
3) both parents and children
4) child in placement (or CWS)
5) other - identify____

63. Were any children of AFDC MA group not residing with the other members of AFDC MA group? 63.____
0) not an AFDC case
1) yes
2) no

64. Was the case name different from recipient name? 64.____
1) yes 2) no

65. Are there any children in AFDC MA group between ages 18 - 21 65.____
0) not an AFDC case
1) yes, reported
2) yes, unreported
3) no

66. Are any children in AFDC MA group, aged 14 and over, not in school 66.____
0) not an AFDC case or no children aged 14 and over
1) yes, reported
2) yes, unreported
3) no

67. Do any children in AFDC MA group between ages 14 - 21 have earned income? 67.____
0) not an AFDC case or no children between ages 14 - 21
1) yes, reported
2) yes, unreported
3) no

68. Is there evidence of income/resources for any children in AFDC MA group? 68.____
0) not an AFDC related case
1) yes, reported
2) yes, unreported
3) no

69. Receipt of SSA benefits by dependent child in AFDC MA group 69.____
0) not an AFDC case
1) yes, reported
2) yes, unreported
3) no

70. Receipt of SSA benefits by parent or caretaker in AFDC MA group 70.____
0) not an AFDC case
1) yes, reported
2) yes, unreported
3) no

71. Child support in AFDC related cases 71.____
0) not an AFDC case
1) yes, court ordered and reported
2) yes, court ordered but unreported
3) yes, voluntary and reported
4) yes, voluntary but unreported
5) no

72. Were Food Stamps received by anyone in AFDC MA group during review period? 72.____
0) not an AFDC case
1) yes
2) no

73. Principal source of income for CWS recipient 73.____
0) not a CWS case
1) legally liable unit
2) state/city probation
3) parental support
4) social security
5) veterans benefits
6) IV B funds
7) other - identify________________________________

74. Custody of CWS child maintained by 74.____
0) not a CWS case
1) Division of Welfare
2) Youth Development Center
3) Probation Department
4) parent
5) Laconia State School
6) other - identify________________________________

75. Total dollar amount of claims paid for entire MA group (or CWS recipient) during review period 75.________

76. Number of months case was open during review period 76.________
1) one month
2) two months
3) three months
4) four months
5) five months
6) six months

77. Cost of review through Level 1 77.________

78. Cumulative cost of review through Level 2 78.________

79. Cumulative cost of review through Level 3 79.________

80. Cumulative cost of review through Level 4 80.________

81. Enter whichever of the following 2 digit answer codes best describes the case situation during the review period: 81.___ ___

NO ERROR

01 - Recipient was eligible entire period of coverage, with no payment error

PAYMENT ERRORS ONLY - 02 through 09

02 - Recipient was eligible entire period of coverage, but client liability for nursing home care was overstated.

03 - Recipient was eligible entire period of coverage, but client liability toward nursing home care was understated.

04 - Recipient was eligible entire period of coverage, but client liability toward "spend down" in MA In & Out situation was overstated.

05 - Recipient was eligible entire period of coverage, but client liability toward "spend down" in MA In & Out was understated.

06 - Recipient was eligible entire period of coverage but third party liability coverage (co-insurance) not applied correctly.

07 - Recipient was eligible entire period of coverage, but a combination recipient and third party liability error existed.

08 - Recipient was eligible for MA, but not for specific service rendered

09 - Legal liability of relative(s) not applied correctly.

ELIGIBILITY ERRORS - 10 & 11

10 - Client liability so understated in "spend down" for MA In & Out that he (she) should have been ineligible for part or all of review period.

11 - Recipient was ineligible for MA during part or all of review period - not due to liability problem.

COMBINED PAYMENT & ELIGIBILITY ERROR - 12

12 - Recipient was ineligible during part of review period; liability problem also existed during a different part of review period.

NOTE: STOP HERE IF QUESTION 81 IS CODED 01 - NO ERROR

<u>ALL CATEGORIES</u>

<u>ERROR RELATED QUESTIONNAIRE</u>

82. Initial error was found at — 82.____
    0) no error in case
    1) Level 1
    2) Level 2
    3) Level 3
    4) Level 4

83. Number of errors found at Level 1 — 83.____
    0) none
    1) one
    2) two
    3) three or more

84. Dollar value of errors at Level 1 (enter 0 if no error was found at Level 1) 84.____

85. Number of errors found through Level 2 — 85.____
    0) none
    1) one
    2) two
    3) three or more

86. Dollar value of errors through Level 2 (enter 0 if no error was found at Level 2) — 86.____

87. Number of errors found through Level 3 — 87.____
    0) none
    1) one
    2) two
    3) three or more

88. Dollar value of errors through Level 3 (enter 0 if no error was found at Level 3) — 88.____

89. Number of errors found through Level 4 — 89.____
    0) none
    1) one
    2) two
    3) three or more

90. Dollar value of errors through Level 4 (enter 0 if no error was found at Level 4) — 90.____

91 - 93. Elements in error case. Enter two digit element code(s) from below — 91.__ __

01)	age	08)	income
02)	citizenship	09)	computations of income
03)	residence	10)	recipient liability
04)	living arrangement	11)	AFDC budgetary allowance
05)	deprivation	12)	grandfather provision
06)	blindness/disability	13)	co-insurance
07)	resources	14)	legal liability

92.__ __

93.__ __

94 - 96. Nature of error(s). Enter two digit nature code(s). — 94.__ __

95.__ __

96.__ __

97-99. Type of error(s). Enter two digit type code from below 97.__ __ 98.__ __ 99.__ __

Recipient Errors

01) change in circumstances not reported
02) information is incorrect
03) information is incomplete

Agency Errors

04) failure to follow up on impending changes
05) failure to follow up on inconsistent or incomplete information
06) failure to verify where required by agency policy
07) correct policy but incorrectly applied
08) wrong policy applied
09) reported information disregarded or not applied
10) arithmetic computation
11) information from SSA is misused by district office
12) information from SSA is inaccurate

100. Amount of nursing home account exceeding the limit allowed 100.____
0) n/a
1) $1 to $50
2) $51 to $100
3) $101 to $300
4) over $300

101. Amount of regular bank account <u>exceeding</u> the limit allowed 101.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

102. Amount of stocks/bonds <u>in excess</u> of the limit 102.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

103. Amount of face value life insurance for categorically needy <u>in excess</u> of - $1,000 for adult individual OR $3,000 for AFDC - related cases; and for husband and wife combined 103.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

104. Amount of cash value life insurance <u>in excess</u> of medically needy limit 104.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

105. Amount of total resources in excess of limit 105.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

106. Amount of monthly earned income (after disregards) in excess of protected income level (for those living independently) or income eligibility ceiling (for those in nursing homes) 106.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

107. Amount of monthly unearned income (after disregards) in excess of protected income level (for those living independently) or income eligibility ceiling (for those in nursing homes) 107.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

108. Amount of combined earned/unearned income in excess of protected income level (for those living independently) or income eligibility ceiling (for those in nursing homes) 108.____
0) n/a
1) 1 to 100
2) 101 to 500
3) 501 to 1,000
4) 1,001 to 5,000
5) over 5,000

109. Payment Error - Third Party Liability Involved 109.__ __

Overpayment by MA	Underpayment by MA
Dollar amount paid by Medicaid that should have been paid by third party	Dollar amount paid by third party that should have been paid by Medicaid
01) $1 to $99	06) $1 to $99
02) $100 to $499	07) $100 to $499
03) $500 to $999	08) $500 to $999
04) $1,000 to $4,999	09) $1,000 to $4,999
05) $5,000 or over	10) $5,000 or over

110. Recipient Liability or Excess Income Errors (For Nursing home OR MA In & Out cases only) 110.____

Dollar amount by which recipient's liability or excess income was understated

0) n/a
1) $1 to $49
2) $50 to $249
3) $250 to $499
4) $500 to $999
5) $1,000 or more

Dollar amount by which recipient's liability or excess income was overstated

6) 1 to 49
7) 50 to 99
8) 100 to 499
9) 500 or more

111. Number of months case was in error during the review period 111.____
0) case was not in error
1) one month
2) two months
3) three months
4) four months
5) five months
6) six months

112. The error(s) in this case can be attributed to 112.____
1) recipient only
2) agency only
3) both recipient and agency

113. Action during review period 113.____
1) Application done during review period
2) Redetermination done during review period
3) Redetermination not done during review period

114. During review period case is: 114.____
1) Adult Independent
2) Nursing Home
3) AFDC

NAME ______________________________

ADULT RELATED

1. _ _ _ _ - _ _ _ _ _

2. _ _ _

3. _ _ _ _ _ _ _ _

4. _ _

5. _ _

6. ____

7. ____

8. ____

9. ____

10. ____

11. ____

12. ____

13. ____

14. ____

15. ____

16. ____

17. ____

18. ____

19. ____

20. ____

21. ____

22. ____

23. ____

24. ____

25. ____

26. ____

27. ____

28. ____

29. ____

30. ____

31. ____

32. ____

33. ____

34. ____

35. ____

36. ____

37. ____

38. ____

39. ____

40. ____

41. ____

42. ____

43. ____

44. ____

45. ____

46. ____

47. ____

48. ____

49. ____

50. ____

51. ____

52. ____

53. ____

54. ____

55. ____

56. ____

57. ____

58. ____

59. 0

60. ____

61. 0

62. 0

63. 0

64. 0

65. 0

66. 0

67. 0

68. 0

69. 0

70. 0

71. 0

72. 0

73. 0

74. 0

75. ____

76. ____

77. ____

78. ____

79. ____

80. ____

81. _ _

82. ____

83. ____

84. ____

85. ____

86. ____

87. ____

88. ____

89. ____

90. ____

91. _ _

92. _ _

93. _ _

94. _ _

95. _ _

96. _ _

97. _ _

98. _ _

99. _ _

100. ____

101. ____

102. ____

103. ____

104. ____

105. ____

106. ____

107. ____

108. ____

109. _ _

110. ____

111. ____

112. ____

113. ____

NAME ______________________________ AFDC / CWS RELATED

1. _ _ _ _ - _ _ _ _ _

2. _ _ _

3. _ _ _ _ _ _ _ _ _

4. _ _

5. _ _

6. ____

7. ____

8. ____

9. ____

10. ____

11. ____

12. 0

13. ____

14. ____

15. ____

16. 0

17. ____

18. ____

19. ____

20. ____

21. ____

22. ____

23. ____

24. ____

25. ____

26. ____

27. 0

28. 0

29. 0

30. 0

31. 0

32. ____

33. ____

34. ____

35. ____

36. ____

37. ____

38. ____

39. ____

40. ____

41. ____

42. ____

43. ____

44. ____

45. ____

46. ____

47. ____

48. ____

49. ____

50. ____

51. 0

52. 0

53. ____

54. ____

55. ____

56. ____

57. ____

58. ____

59. ____

60. ____

61. ____

62. ____

63. ____

64. ____

65. ____

66. ____

67. ____

68. ____

69. ____

70. ____

71. ____

72. ____

73. ____

74. ____

75. ____

76. ____

77. ____

78. ____

79. ____

80. ____

81. _ _

82. ____

83. ____

84. ____

85. ____

86. ____

87. ____

88. ____

89. ____

90. ____

91. _ _

92. _ _

93. _ _

94. _ _

95. _ _

96. _ _

97. _ _

98. _ _

99. _ _

100. ____

101. ____

102. ____

103. ____

104. ____

105. ____

106. ____

107. ____

108. ____

109. _ _

110. ____

111. ____

112. ____

113. ____

Appendix D

WORKSHEETS USED FOR INTENSIVE SEQUENTIAL REVIEW

TYPE OF CASE ☐ AFDC RELATED
☐ ADULT INDEPENDENT
☐ NURSING HOME

MEDICAID ELIGIBILITY QUALITY CONTROL

- Worksheet for Sequential Review -

Review No. ______

IDENTIFYING INFORMATION

1. RECIPIENT ______
2. RECIPIENT I.D. # ______
3. CASE NAME ______
4. ADDRESS ______
5. TELEPHONE # ______
6. DISTRICT OFFICE ______
7. DATE OF MOST RECENT ACTION BEFORE 3/1/78 ______
8. TYPE OF ACTION ______
9. AMOUNT OF CLAIMS PAID ______
10. CATEGORY DURING REVIEW PERIOD ______
11. DATE OF INITIAL APPLICATION ______
12. REVIEW PERIOD ______
13. REVIEWER ______
14. SUPERVISOR ______

MEMBERS OF THE RECIPIENT'S HOUSEHOLD

	NAME	BIRTHDATE	RELATIONSHIP	SOCIAL SECURITY #	✓ OR •
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

SIGNIFICANT PERSONS NOT IN THE RECIPIENT'S HOUSEHOLD

	NAME	RELATIONSHIP	ADDRESS
1.			
2.			
3.			
4.			
5.			

REVIEW FINDINGS

LEVEL	# ERRORS	DOLLAR VALUE	ELEMENT AND NATURE
1			
2			
3			
4			

COST OF REVIEWS

LEVEL	HOURS SPENT ON REVIEW	X RATE +	OVERHEAD EXPENSE +	TRAVEL EXPENSE =	TOTAL COST	CUMULATIVE COST
1		$ 8.00				
2		$ 8.00				
3		$ 8.00				
4		$ 8.00				

INCOME

Review No.________

	LEVEL 1	LEVEL 2	LEVEL 3	
ELEMENT	CASE RECORD ANALYSIS	VERIFIED INFORMATION	INFORMATION REPORTED DURING INTERVIEW	VERIFIED INFORMATION
EARNED INCOME OR UNEMPLOYMENT COMPENSATION				
SSA OR SSI				
VETERANS BENEFITS				
SUPPORT PAYMENTS				
PENSIONS				
OTHER INCOME				
GRANDFATHER COVERAGE PROVISIONS				
RECIPIENT LIABILITY				
INCOME COMPUTATIONS				

LEVEL 4
FINDINGS OF FIELD INVESTIGATION

LEVEL 4	
COMPARISON OF EXPENSES TO INCOME	WORK AND RESIDENCE HISTORY
1. RENT 2. HEAT 3. UTILITIES 4. MORTGAGE PAYMENT 5. FOOD 6. TRANSPORTATION 7. TELEPHONE 8. LOAN PAYMENTS 9. INSURANCE PREMIUMS 10. OTHER 11. OTHER 12. TOTAL EXPENSES ____ 13. TOTAL INCOME ____	WORK HISTORY: RESIDENCE HISTORY:

RECIPIENT'S NAME ______________________

REVIEW NUMBER ______________________

REVIEWER ______________________

RESOURCES

LEVEL I	
ELEMENT	CASE RECORD ANALYSIS
BANK ACCOUNTS	
[illegible]	
PREPAID BURIAL ARRANGEMENT	
LIFE INSURANCE	
MEDICAL INSURANCE	
OTHER	
RESOURCE COMPUTATIONS	

INCOME

LEVEL I	
ELEMENT	CASE RECORD ANALYSIS
EARNED INCOME OR UNEMPLOYMENT COMPENSATION	
SSA OR SSI	
VETERANS BENEFITS	
SUPPORT PAYMENTS	
PENSIONS	
OTHER INCOME	
GRANDFATHER COVERAGE PROVISIONS	
RECIPIENT LIABILITY	
INCOME COMPUTATIONS	

CATEGORICAL AND OTHER

LEVEL I	
ELEMENT	CASE RECORD ANALYSIS
AGE	
CITIZENSHIP OR LEGAL ALIEN	
RESIDENCE	
LIVING ARRANGEMENT	
BLINDNESS OR DISABILITY	
MARITAL STATUS	
AFDC DEPRIVATION FACTOR	
REAL PROPERTY	
DISPOSAL OF PROPERTY	

RESOURCES

Review No.______

	LEVEL 1	LEVEL 2	LEVEL 3	
ELEMENT	CASE RECORD ANALYSIS	VERIFIED INFORMATION	INFORMATION REPORTED DURING INTERVIEW	VERIFIED INFORMATION
BANK ACCOUNTS				
NURSING HOME ACCOUNT				
PREPAID BURIAL ARRANGEMENT				
LIFE INSURANCE				
MEDICAL INSURANCE				
OTHER				
RESOURCE LIMITATIONS				

RECIPIENT'S NAME ______________________

REVIEW NUMBER ______________________

REVIEWER ______________________

RESOURCES

LEVEL 3

ELEMENT	INFORMATION REPORTED DURING INTERVIEW
BANK ACCOUNTS	
[illegible]	
PREPAID BURIAL ARRANGEMENT	
LIFE INSURANCE	
MEDICAL INSURANCE	
OTHER	
RESOURCE COMPUTATIONS	

INCOME

LEVEL 3

ELEMENT	INFORMATION REPORTED DURING INTERVIEW
EARNED INCOME OR UNEMPLOYMENT COMPENSATION	
SSA OR SSI	
VETERANS BENEFITS	
SUPPORT PAYMENTS	
PENSIONS	
OTHER INCOME	
GRANDFATHER COVERAGE PROVISIONS	
RECIPIENT LIABILITY	
INCOME COMPUTATIONS	

CATEGORICAL AND OTHER

LEVEL 3

ELEMENT	INFORMATION REPORTED DURING INTERVIEW
AGE	
CITIZENSHIP OR LEGAL ALIEN	
RESIDENCY	
LIVING ARRANGEMENT	
BLINDNESS OR DISABILITY	
MARITAL STATUS	
AFDC DEPRIVATION FACTOR	
REAL PROPERTY	
DISPOSAL OF PROPERTY	

LEVEL 4
FINDINGS OF FIELD INVESTIGATION

CATEGORICAL AND OTHER

LEVEL 1		LEVEL 3	LEVEL 4
ELEMENT	CASE RECORD ANALYSIS	INFORMATION REPORTED DURING INTERVIEW	FINDINGS OF FIELD INVESTIGATION
AGE			
CITIZENSHIP OR LEGAL ALIEN			
RESIDENCY			
LIVING ARRANGEMENT			
BLINDNESS OR DISABILITY			
MARITAL STATUS			
AFDC DEPRIVATION FACTOR			
REAL PROPERTY			
DISPOSAL OF PROPERTY			

TIME SHEET - LEVEL 2

Recipient	Send Correspondence	RECORD VERIFICATIONS						Computations	Total
		Date	Time	Source	Date	Time	Source		

TIME AND TRAVEL SHEET - LEVEL 3

Recipient	Interview	Send Correspondence	RECORD VERIFICATIONS						Computations	Total Time	Travel
			Date	Time	Source	Date	Time	Source			

TIME AND TRAVEL SHEET - LEVEL 4

Recipient	Collateral Interviews	Registries of Deeds and Probate	Send Correspondence	RECORD VERIFICATIONS						Computations	Total time	Travel
				Date	Time	Source	Date	Time	Source			

Appendix E

ADDITIONAL STATISTICAL RESULTS ON THE INTENSIVE SEQUENTIAL REVIEW

ISR STATISTICS

ERROR ELEMENTS BY LEVEL INITIAL ERRORS

-Combined Cases-

ELEMENT \ LEVEL	I		II		III		IV	
	#	%	#	%	#	%	#	%
Living Arrangement	none	n/a	none	n/a	none	n/a	none	n/a
Resources	12	52.17	12	20.00	3	30.00	5	29.41
Income Related (Income, Computations of Income, Recipient Liability)	11	47.83	44	73.33	6	60.00	5	29.41
Coinsurance	none	n/a	4	6.67	none	n/a	7	41.18
Legal Liability	none	n/a	none	n/a	1	10.00	none	n/a
TOTAL	23	20.[illegible]	60	54.54	10	9.09	17	15.45

ISR STATISTICS

INITIAL AND SUBSEQUENT ERRORS BY ELEMENT

-COMBINED CASES-

LEVEL / ELEMENT	I		II		III		IV	
	#	%	#	%	#	%	#	%
Residency	none	n/a	none	n/a	1	6.25	none	n/a
Living Arrangement	none	n/a	none	n/a	none	n/a	1	4.76
Resources	12	52.17	16	23.53	3	18.75	7	33.33
Income Related	11	47.83	47	69.12	10	62.50	5	23.81
Coinsurance	none	n/a	5	7.35	1	6.25	8	38.10
Legal Liability	none	n/a	none	n/a	1	6.25	none	n/a
TOTAL	23	17.99	68	53.12	16	12.50	21	16.41

EQUALIZED BENEFIT/COST RATIOS*

CATEGORY	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Adult Independent	.18	4.43	2.14	1.89
Nursing Home	51.47	49.90	32.78	22.50
AFDC Related	1.09	3.15	1.67	2.96
Combined	28.50	31.54	19.72	14.73

* $\frac{eB}{C}$ where: e = error detection efficiency
B = Benefit
C = Cost

Revised

INTENSIVE SEQUENTIAL REVIEW STATISTICS

AVERAGE DOLLAR VALUE OF ERROR CASES

LEVEL / CATEGORY	I	II	III	IV
ADULT INDEPENDENT	7.68 (23.52)*	102.94 (119.86)	92.45 (104.71)	96.96 (106.26)
NURSING HOME	1945.88	938.39 (977.03)	1124.60 (1168.07)	1241.81 (1284.84)
AFDC	76.92	80.08	78.29	177.89
OVERALL	1224.51 (1338.01)	664.77 (702.60)	758.81 (797.55)	804.22 (838.83)

* Dollar value when computed without underpayment errors

Revised

INTENSIVE SEQUENTIAL REVIEW STATISTICS

DOLLAR VALUE OF ERROR CASES-INDIVIDUAL LEVELS

LEVEL / CATEGORY	I	II	III	IV
ADULT INDEPENDENT	7.68 (23.52)*	100.22	9.12	27.62
NURSING HOME	1945.88	377.08 (393.26)	237.39	227.83
AFDC	76.92	60.85	7.11	113.83
OVERALL	1277.74 (1401.72)	283.06 (291.34)	156.33	159.23

* Dollar value when computed without underpayment errors

Revised

INTENSIVE SEQUENTIAL REVIEW STATISTICS

AVERAGE LEVEL COSTS BY CATEGORY

LEVEL / STATUS	I		II		III		IV	
ERROR	AI	9.89	AI	15.57	AI	31.28	AI	50.21
	NH	9.69	NH	17.22	NH	32.30	NH	57.63
	AFDC	10.50	AFDC	19.38	AFDC	39.06	AFDC	62.16
NON ERROR	AI	8.84	AI	13.43	AI	32.81	AI	51.85
	NH	8.78	NH	14.42	NH	28.95	NH	51.89
	AFDC	13.72	AFDC	18.18	AFDC	37.98	AFDC	59.41
COMBINED BY CATEGORY	AI	9.18	AI	14.11	AI	32.32	AI	51.33
	NH	9.30	NH	16.03	NH	30.88	NH	55.19
	AFDC	12.86	AFDC	18.50	AFDC	38.27	AFDC	60.15
OVERALL AVERAGE, LEVEL		9.88		15.74		32.71		54.61

Revised

INTENSIVE SEQUENTIAL REVIEW STATISTICS

Average Level Costs Per Individual Level

Status \ Level	Category	I	II	III	IV
ERROR	AI	9.89	5.68	15.71	18.93
	NH	9.69	7.53	15.08	25.33
	AFDC	10.30	8.88	19.68	23.10
NONERROR	AI	8.84	4.59	19.38	19.04
	NH	8.78	5.64	14.53	22.94
	AFDC	13.72	4.46	19.80	21.43
COMBINED BY CATEGORY	AI	9.18	4.93	18.21	19.01
	NH	9.30	6.73	14.85	24.31
	AFDC	12.86	5.64	19.77	21.88
OVERALL AVERAGE PER LEVEL		9.88	6.00	17.44	21.77

ISP STATISTICS

ERROR ELEMENTS BY LEVEL-INITIAL ERRORS

-Adult Independent-

LEVEL / ELEMENTS	I		II		III		IV	
	#	%	#	%	#	%	#	%
Living Arrangement	none	n/a	none	n/a	none	n/a	none	n/a
Resources	none	n/a	3	27.27	none	n/a	none	n/a
Income Related (Income, Computations of Income, Recipient Liability)	6	100.00	7	63.64	4	100.00	4	50.00
Coinsurance	none	n/a	1	9.09	none	n/a	4	50.00
Legal Liability	none	n/a	none	n/a	none	n/a	none	n/a
TOTAL	6	20.69	11	37.93	4	13.79	8	27.59

ISR STATISTICS

ERROR ELEMENTS BY LEVEL-INITIAL ERRORS

-NURSING HOME-

LEVEL / ELEMENT	I		II		III		IV	
	#	%	#	%	#	%	#	%
Living Arrangement	none	n/a	none	n/a	none	n/a	none	n/a
Resources	11	73.33	9	21.43	3	60.00	5	71.43
Income Related (Income, Computations of Income, Recipient Liability)	4	26.67	30	71.43	1	20.00	none	n/a
Coinsurance	none	n/a	3	7.14	none	n/a	2	28.57
Legal Liability	none	n/a	none	n/a	1	20.00	none	n/a
TOTAL	15	21.74	42	60.87	5	7.25	7	10.14

ISR STATISTICS

ERROR ELEMENTS BY LEVEL-INITIAL ERRORS

-AFDC-

LEVEL / ELEMENTS	I		II		III		IV	
	#	%	#	%	#	%	#	%
Living Arrangement	none	n/a	none	n/a	none	n/a	none	n/a
Resources	none	n/a	none	n/a	none	n/a	none	n/a
Income Related (Income, Computations of Income, Recipient Liability)	2	100.00	7	100.00	1	100.00	1	50.00
Coinsurance	none	n/a	none	n/a	none	n/a	1	50.00
Legal Liability	none	n/a	none	n/a	none	n/a	none	n/a
TOTAL	2	16.67	7	58.33	1	8.34	2	16.67